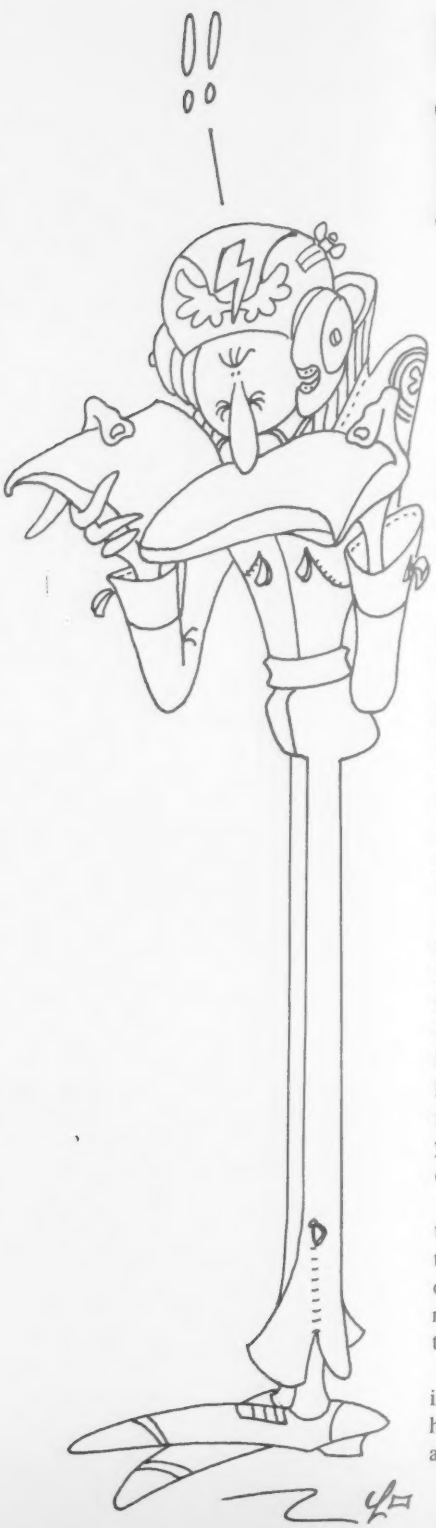
approach

JUNE 1980 THE NAVAL AVIATION SAFETY REVIEW



Know thy NATOPS!

By LT Steve Dean
VR-57

THE NATOPS instructor has just tripped you up on one of his favorite questions. "No big deal," he says. "It's in a footnote on one of the takeoff performance charts. Take a look at it sometime."

Terrific! Is the guy trying to be a clown, or is he making a valid point? He may follow up with something to the effect that "It's really hard to find what you're looking for in the NATOPS manual, sometimes." That may be, but when the mishap occurs and the procedure for how to handle it was in the NATOPS, the investigating board's conclusion will be pilot error, not "It's really hard to find what you're looking for in the NATOPS manual, sometimes."

"Know thy NATOPS" is another way of saying know your aircraft, its systems, its limitations, and the emergency procedures. But it would be wise to take the phrase literally and know your NATOPS and the associated NATOPS emergency flip pad inside and out, so you are familiar enough to find that little tidbit of information that may become so critical when the chips are down. Is it under landing gear or hydraulics, fuel systems or engines? What is contained under the heading *Miscellaneous Systems* in the emergency procedures section? Maybe you have just perfectly executed the procedure for landing with no antiskid, detailed in the emergency section, only to learn as you are sitting in the weeds at the end of the runway that there was a footnote in the performance data section that said, "Landing ground roll will be increased 75 percent for manual braking."

A lot of emphasis is placed on "bold face" emergencies and limitations, and well it should be, since these are the ones that are most costly in terms of lives and airplanes lost if they are handled incorrectly. Nevertheless, the abnormal situations that occur far more often to most rank-and-file aviators are those which may only result in expensive dents and, sometimes, red faces. Many of these allow time for us to request holding and break out the book to review the correct handling of the situation. Of course, if you haven't looked at the book in several weeks, it may not be of much use if you are not familiar enough to know what you're looking for. And it's also no time to find out that you inadvertently discarded the portion you need when you inserted those last page changes.

Take the time, sit down, and get to know your NATOPS. When it's your turn to give the monthly systems lecture and exam, be innovative. Don't just rehash the same old things that everyone already knows. Try to look for that important item that has been overlooked or played down. (This is not a recommendation to waste time with trivial nonsense, however.) And as you discover errors or areas that need clarification, point them out to the NATOPS officer so a change recommendation can be made.

As a good check, take a look at the accident/incident review board, and place yourself in the position of the pilots involved. Go through and honestly appraise how you would have handled the situation. Would you have handled it correctly? Would you have been able to find the correct answer in your NATOPS?

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The SH-3H Sea King on this month's cover was painted by APPROACH artist Blake Rader.

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The concept of privilege in the naval aviation safety program

IS IT WORTH IT?

By LtCol Ralph K. Park, USMC
Marine Liaison Officer
Naval Safety Center

Concepts of Privileged Communications. The concept of privilege in the naval aviation safety program is based on the belief that more useful aircraft accident reports can be obtained if individuals who provide information to aircraft mishap boards, members of those boards, and endorsers of accident reports are not inhibited by the prospect that the information, reports, and endorsements will be used for some purpose other than accident prevention. Communications between accident investigator and witness are therefore held to be **privileged,** as are accident reports and all endorsements; none of this information may be disclosed except for safety purposes.

On the other hand, in the eyes of the law, a privileged communication is one which the participants cannot be forced to disclose under legal compulsion. These communications occur in confidential relationships, such as those:

- in the sanctity of the marital relationship
- between physician and patient
- between psychological counselor and client
- between priest and penitent
- between attorney and client

There are two pertinent distinctions between traditional privileged communications and those in naval aviation safety. In traditional relationships, passage of privileged information and the prohibitions against its disclosure are for the benefit of the communicators. In naval aviation safety, they are **not** primarily for the communicator's benefit, but rather for a greater good – the benefit of the naval aviation community as a whole. The concept would seem to deserve considerable strength in the eyes of the law. We shall see.

The second distinction is that the traditional concept of privileged communications is well founded in law. Any law dictionary will give you a definition similar to that above. This is not the case with the concept of privilege as it has developed in military aviation safety programs. These programs have developed on the separate authorities of the Secretaries of the various components of the Department of Defense.

The Naval Aviation Experience. Within the Department of the Navy, Chief of Naval Operations *Aviation Circular Letter No. 48-44,* dated 1 June 1944, offers early evidence of the concept of privilege in naval aviation safety. Form *NAVAIR 339,* formerly designated an *Aircraft Trouble Report,* was changed to an *Aircraft Accident Report,* and the following explanation accompanied the change:

> The *Aircraft Accident Report* is designed to promote flight safety measures as distinguished from disciplinary action investigations. While it will not be used as evidence in disciplinary cases . . . it in no way relieves the commanding officer from his responsibility for conducting a separate investigation and taking proper action where culpability is involved.

Refinement of the concept can be traced through sequential editions of naval aviation safety directives. For example, the statement above separates safety and legal investigations, but in the very next sentence, they are reunited:

> Where an *Aircraft Accident Report* shows negligence or culpability to exist, **in order to complete the record** (emphasis added), the commanding officer shall indicate on the *Aircraft Accident Report* what disciplinary measures he has initiated or taken.

This requirement "to complete the record," with references to disciplinary measures, soon disappeared, and the divorce of the legal and safety aspects of mishaps became final:

> In the interest of naval aviation safety, it is imperative that aircraft accident investigations . . . be free of any connotation of disciplinary action.
>
> OPNAVINST 3750.6B
> 20 May 1956

An individual is considered to have an obligation to report hazards for the benefit of all who are involved in naval aviation. He should have the right to do so without incurring personal jeopardy in the process.

At the present time, the essential elements of privilege in the naval aviation safety program are:

An assurance to witnesses, by accident investigators, that their testimony will be used **only** for safety purposes.

Provisions for protection of information in mishap reports to prevent any use other than for safety. These include:

- Strict rules against disclosure of testimony *per se.*
- Separation of mishap investigations from those conducted for other purposes.
- Prohibition against aircraft mishap board-members serving in other capacities in connection with a mishap.
- Restrictions against mixing parts of mishap reports with other reports.
- Controlled release of mishap information within the Department of the Navy.
- Release of mishap information outside the Department of the Navy only by CNO or his designee.
- Administrative safeguards:
  - Limited initial distribution of mishap reports.
  - Limitations on the number and seniority level of agencies which can readdress mishap reports.
  - Labels on mishap reports which warn of the fact that they require special handling and are for limited use.

The Pro and Con of the Issue. The concept of privilege developed hand-in-glove with the naval aviation safety program. As the safety program developed, the accident rate rapidly went down. During the past few years, however, the accident rate has become relatively stable. This levelling of the accident rate calls for a reevaluation of the aviation safety program and of the most controversial aspect of that program – the concept of privilege. **Is it effective enough to justify whatever burdens we carry with it?** It was always a fair question; it is now also a timely one. Let us examine some points of view on both sides of the issue.

Disadvantages. *"We would be better off without privilege!"* – a statement heard on occasion. Let's look at a few of the reasons some people think so.

"It's a coverup. The program defeats itself. Once information gets privileged status, nobody can get it, or use it. It just becomes a big secret-keeping system."

When pressed for an example of some essential safety information which has actually remained unused because it had been included in an accident report, critics are usually stuck for an answer. It is, however, very easy to see how the perception of a *coverup* develops. Preliminary and supplementary message reports (the first two on the wire following an accident) receive very wide distribution. Even if someone should miss an accident in the message traffic, they no doubt read of it in the Weekly Summary, or hear of it in the readyroom or hangar, so nearly everyone knows when there has been an accident. But the accident report *per se* receives very limited distribution for obvious reasons: limited distribution helps ensure limited use. The situation is similar to publishing the first chapters of a mystery and not the ending. If the safety program is working correctly, everybody does get *the ending,* but it is sometimes not recognizable as such. An airframe change, a flight safety advisory message, a NATOPS change, or any one of a dozen different mishap

prevention actions may be taken as a result of a mishap. But, unable to connect these actions with specific mishaps, one could think mishap reports aren't being properly used.

There is obviously no prohibition against the use of privileged information for safety purposes. If such information is not used for safety, somebody should be fired.

The real problem with the *coverup* complaint is that perceptions of a *coverup* exist, and this can give the safety program a reputation for secrecy, deserved or not. The problem is bigger, too, than just in-house perceptions. Activities external to the Department of the Navy don't understand how there could possibly be a good reason to withhold information about a naval aviation mishap. At any time, let alone in the climate created by Watergate and the Freedom of Information Act, it is tough to withhold information from the citizenry. It's like saying to your boss that you can't tell him what you're doing if you are to be able to keep doing it properly. That's asking for a lot of trust from the boss!

The only solution here is probably education. Within the naval aviation community, more published material on privilege might help. It may be noted that whenever external agencies are denied mishap information, they are given a full and detailed explanation of the basis for denial.

"It causes double work. When we have an accident, the safety investigation and the JAG investigation go on at the same time. Without privilege, one investigation could do both jobs and save manpower." This statement invariably indicates a lack of understanding of the safety program. It is a fact that some simultaneous effort is expended in two or more investigations of the same accident. Some cooperation is permissible during different kinds of investigations, but not much, and such cooperation must be very carefully handled to avoid fouling both investigations. They must remain independent, even though they may be simultaneous investigations of the same event. So we do have simultaneous effort, but the same things are not being accomplished. The diverse purposes of the investigations require different procedures and different reports. If both purposes are to be adequately accomplished, the different procedures and reports are both required.

We may conclude that, insofar as investigations are concerned, maintaining privilege does cause some additional work.

"It is a myth. It simply doesn't work. We could get just as good a report by reading witnesses their rights as we do by assuring them privilege, or by promising them that limited use will be made of the report."

Whether it works or not may be a perpetual argument, because both sides of the issue lack tangible evidence in support of their arguments. There is no way to measure the validity of the theory that we get more and better information from witnesses by assuring privilege.

It is hoped that, by now, even without the formality of a promise of confidentiality, an attitude has developed which automatically opens lines of communication (e.g. – "You can't get in trouble talking to the Aviation Safety Officer."). But, when it exists, to what degree is this attitude effective? How much faith is put in the promise of confidentiality? How much does it influence witnesses' responses? No one can answer these questions with precision.

Since we can't measure faith, could we make an analysis of mishap reports to see how many cases have been solved by information from witnesses who cooperated just because of privilege? We could, but from an analysis of reports we would probably detect only one of this nature in a hundred. In most reports, we can't tell which information came from which source, let alone why it was provided. In some cases, a little chunk of information here and a little there, when put together, enable a skillful investigator to solve a mysterious accident. Who knows which information became available as a result of the attitudes which have developed due to the assurance privilege?

"It's too complex. Nobody in the Fleet should be expected to understand such an involved concept well enough to handle it properly, and the legal and safety aspects of a mishap must eventually merge in the mind of at least one individual – the commanding officer. He couldn't possibly be expected to keep them apart!"

There is no doubt that the concept is different from most that we encounter, but it is not beyond comprehension. It is certainly simpler than some legal concepts we are all expected to understand.

Insofar as the commanding officer's problem is concerned (and it is also the problem of every reviewer of the mishap report), it is true that he is expected to cope with safety matters based on one set of information, and all other matters (legal actions, fitness reports, evaluation boards, etc.) based on completely different collections of information. It is not all

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that difficult.. Within this nation's legal system, jurors are expected to be capable of the same kind of mental gymnastics when a judge says: "The jury will disregard what was just heard." If jurors can do it, COs can do it. The problem is that some COs don't do it. For example, despite the fact that the very foundation of the concept of privilege lies in the separation of disciplinary matters and safety, a CO's endorsement still appears from time to time with references to disciplinary action taken in connection with a mishap. One CO recently stated that he considered disciplinary action an integral part of the safety program! It is certainly not part of the safety program prescribed by the Chief of Naval Operations.

Disciplinary action and safety are **not** mutually exclusive. They are both necessary, but separately – never mixed. This is obviously an education problem at the CO level.

"It's a nuisance. 'FOR OFFICIAL USE ONLY,' 'SPECIAL HANDLING REQUIRED,' and 'LIMITED USE' markings, the limited distribution, the rules on readdressals of messages, and the attention all these things require are an administrative headache."

They certainly **are** a headache, but let's keep them in perspective. It's a much smaller headache than the control of classified material. In addition, the manpower structure provides an expert to watch over this program – the Aviation Safety Officer. There is a school where the ASO learns all about it. Still, there's no denying it, privilege is an administrative nuisance.

"It's too tenuous. We're giving false assurances that the information provided in safety investigations will be used only for safety. We can make this assurance only insofar as the Department of the Navy is concerned. The first time a mishap report is accepted as evidence in a civil court, the whole system will collapse."

The fact is that all the service aviation safety programs have essentially the same provisions for privilege, and military aviation accident reports have been introduced as evidence in civil courts, but none of the programs has collapsed. This is probably due to the fact that a civil court judgment, often years after an accident, normally has no effect on those involved in a naval aircraft mishap. These few cases have, therefore, not resulted in a perception of a breech of faith on the part of the services.

Additionally, the courts have nearly always held in favor of privilege. In one recent case, the court noted:

> We agree with the Government that when disclosure of investigative reports, obtained in large part through promises of confidentiality, would hamper the efficient operation of an important Government program and perhaps even, as the Secretary here claims, impair the national security by weakening a branch of the military, the reports should be considered privileged.

Addressing the same case, that court held that privilege applied only to disclosures by private (as distinguished from service) personnel, feeling that the reasons advanced for nondisclosure did not apply to information obtained from service people.

A later court stated:

> With respect, we are unable to follow the reasoning upon which this distinction rests. It is true that service personnel need not fear one consequence that may attend disclosures by a private person: suit against his employer, with its attendant unpleasantness for him. But service people are human, too. They fear disciplinary action, work and hope for promotion, possess loyalties and ties of friendship to people and organizations, dislike speculating to the derogation of others' reputations, especially those of the dead, etc. In short, they have a most gracious sufficiency of reasons for withholding derogatory information if it is to reflect upon, or even be attributed to, them. Matters of good faith aside, we think ample basis exists for respecting assurances of confidence given them, and that any attempted distinction between such assurances given them and those given private persons is not sound.

In summary on this point, the concept of privilege has not collapsed in the face of an adverse court decision in the past. There is no reason to expect that it will in the future.

Advantages. On the other side of the issue are the proponents of the concept of privilege.

"If it works at all, it works well enough. If the cause of

only one accident in a hundred is found because of privilege, that is sufficient. The saving of one aircraft, or one life, would justify the concept."

This pragmatic argument is difficult to refute. Of course, it presumes that we will do something to eradicate discovered causes of mishaps. If we don't, we have a different problem – a weak safety program.

It is obvious that privilege can be extremely valuable in the determination of mishap causes when success is least likely – in those cases where a fruitful investigation is dependent on information an individual is most prone to withhold (e.g. – self-incriminating information, information incriminating a close friend, etc.).

"It frees the AMB. An aircraft mishap board will produce a better report, and endorsers will be more forthright, knowing they are free to express themselves without having to sweeten things up for consumption outside the safety program."

This thought is found in both legislative committee reports on the Freedom of Information Act, but unfortunately, not in connection with safety. Addressing the fifth exemption to the act, which covers "interagency or intraagency memoranda," the committee reports both state that a purpose of the fifth exemption is to avoid inhibiting frank discussion in the process of arriving at important positions. A climate which encourages frank discussion is precisely that needed by AMBs and endorsers of reports. One can imagine the vague and obscure reports which AMBs and endorsers would submit if copies of such reports were to be provided to the surviving widow of a deceased crewmember, the promotion board of a surviving pilot, the JAG investigator, or the local newspaper.

It should be noted that the above argument holds, regardless of whether or not witnesses are involved, and only loses steam if the program is not used as it is designed. If AMBs don't exercise the freedom provided them by regulation, this advantage of the program is all for naught.

"The concept is a cornerstone of the naval aviation safety program. It supports the other principles of the program, and anything else would be contradictory and inconsistent."

Every good safety program is dependent on voluntary information. It would, of course, be possible to have some sort of safety program based solely on sworn testimony from those who know something about how a given mishap occurred. Assuming we could be successful in gaining sufficient information about a mishap on a "tell-me-but-you-might-get-yourself-or-somebody-else-in-trouble" basis, this might be effective in preventing mishap recurrence. But this would leave us in the uncomfortable position of having to experience each type of accident the first time in order to avoid the second.

Prevention of the first mishap, through the identification and elimination of hazards, has long been recognized as the superior approach in aviation safety. We therefore rely on the voluntary reporting of hazards by those who know them best – those individuals and commands involved.

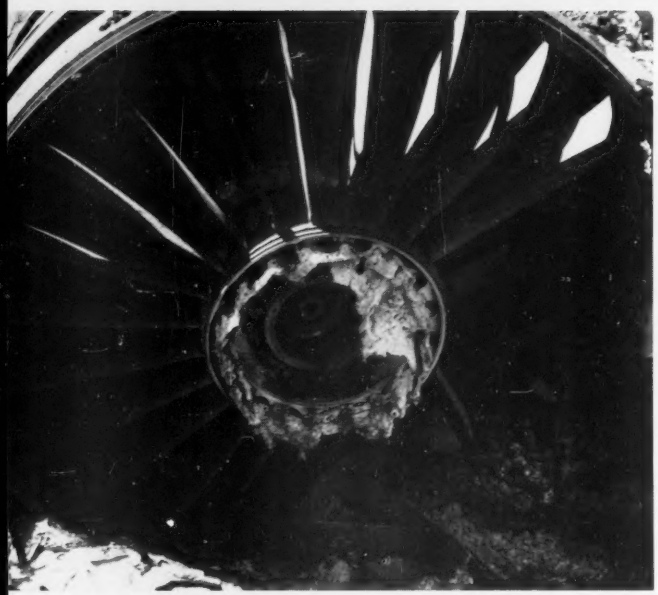
The naval aviation safety program therefore functions on mishap information submitted by the individual or organization identifying the hazard before or after it causes a mishap. In naval aviation, all squadrons are required to maintain their own permanent aircraft mishap boards as opposed to AMBs appointed by higher authority. This supports the nonadversary principle of voluntary submission of safety information in that we avoid the specter of mandatory disclosure and the misconception that safety is only the business of higher authority.

An individual is considered to have an obligation to report hazards for the benefit of all who are involved in naval aviation. He should have the right to do so without incurring personal jeopardy in the process. The concept of privilege protects that right – the right of an individual to confide in his service for the protection of fellow service members. The fact that this right is clearly protected by directives lends authority and support to the concept. The regulations are direct evidence of the commitment of the Navy and Marine Corps to the naval aviation safety program.

The alternative is almost ludicrous. Imagine the response to an accident investigator who approaches a witness with an explanation of that witness' rights under Article 31, UCMJ (the prohibition against self-incrimination).

Summary of the Controversy. To summarize the perceived disadvantages of the concept of privilege in naval aviation safety, it is seen as an administrative nuisance, a coverup, and a cause of additional labor in mishap investigation. It also requires education and understanding at every level. It requires diligent custodianship. A few opponents doubt its practical effectiveness. Others don't believe it can survive future tests in court.

On the other hand, there are those who maintain that if it works even a little, that is enough. Additionally, there is the opinion that it frees AMBs and endorsers of reports to *tell it like it is.* And finally, there is the point that the concept is a major cornerstone of the entire naval aviation safety program.



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Where Do We Go From Here? No matter which side of the issue is favored, it is clear that if the services persist in the concept of privilege they should not have to repeatedly defend that concept in court. Despite past successes in the courts, the number of cases in which the services have been involved illustrates that we are repeatedly and literally at the mercy of the courts if we continue without a legislative basis for privilege. The Congress, as early as 1910, provided for the shielding of accident investigation reports in the railroad field against use in litigation. Accident reports of the National Transportation Safety Board are protected against use as evidence in any suit or action for damages. But there is no law protecting military aviation mishap reports. Several times in the past decade, a bill has been proposed "to amend Title 10, United States Code, to provide for the investigation of accidents involving aircraft of an armed force, and to clarify the use of reports of those investigations." The bill would have essentially set into the law the existing policies of the services. It has never been passed.

If we believe in the concept of privilege, we should enthusiastically support legislation to set that concept firmly into the law of the land. Not only would such legislation preserve longstanding safety policies within all the services, it would clearly demonstrate congressional support of military aviation safety programs.

While the separation of the Aircraft Accident Report, and the Navy's safety program in general, from disciplinary action is clearly important, this separation is in no way intended to preclude command action where culpability is involved. It is the responsibility of the command to conduct a separate investigation, whether formal or informal, to ascertain whether negligence, dereliction of duty, or any other violation of UCMJ has occurred in conjunction with a mishap. If culpability is discovered, appropriate disciplinary or administrative action should follow. If this is not done, any notion of accountability within naval aviation will quickly disappear. –Ed.

HAWKits Are Missing

The people that distribute our HAWKits, Naval Education and Training Centers Atlantic and Pacific, are having a difficult time filling Fleet requests. Why? Because HAWKits are not being returned within the prescribed 30-day loan period. Please check your files and desk drawers for these items. And, if any are found, return them so someone else can benefit from their information.

Postflight ear blocks

or

You're Going to Stick a Tube in My Nose and Blow Out My What?

By LCDR Ben Withers
Aviation Medical Safety Officer
COMNAVAIRPAC

How much do YOU know about postflight ear blocks? You can find out right now by taking this easy quiz!

1. An ear block is:
   a. A block put on a short defensive lineman by a tall offensive lineman.
   b. A toy for a 3-year-old.
   c. A blockage of the Eustachian tube.
   d. A blockage of the external ear canal.
   e. An infection of the middle ear.

2. If your ear blocks during descent, the maneuver to attempt to clear it is:
   a. Immelmann
   b. Valsalva
   c. M-1
   d. Rokitansky

3. This maneuver is best described as:
   a. Tensing your abdomen and grunting.
   b. Putting your head between your knees and breathing slowly.
   c. Pinching your nose shut, closing your mouth, and "blowing your fingers off your nose."
   d. Too risky to be done except *in extremis.*

4. As a P-3 PPC, you're in the landing pattern and one of your crew complains of ear pain. You should:
   a. Continue to land and take him to sickbay.
   b. Chew him out for disturbing you in the landing pattern.
   c. Level off and/or ascend.

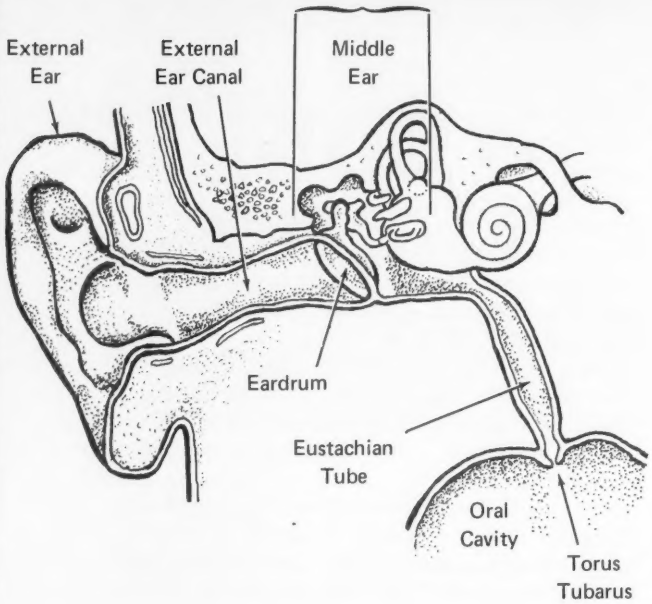
5. After landing, the P-3 crewman still has ear pain and can't clear it. He should:
   a. Go immediately to sickbay.
   b. Finish postflight, debrief, and then go to sickbay.
   c. Pick up some "cold pills" and go to sickbay if it doesn't get better.

6. At sickbay, this crewman is seen by the duty doctor, a nonflight surgeon, who prescribes *Actifed* and tells him to go home. He should:
   a. Put an *Actifed* in the affected ear and go home.
   b. Go home, but return in the a.m. to see a flight surgeon.
   c. Insist on seeing a flight surgeon or aviation medicine corpsman.

7. After landing, your H-46 crewman tells you that he has a slight pressure in his right ear and he can't hear well. You know that:
   a. This crewman is a chronic complainer and you pay no attention to him.
   b. This represents an ear block and must be immediately treated.
   c. Rotorheads don't go high enough to get ear blocks, so it must not be anything of consequence.

8. S. H. Flier, a first tour F-14 pilot, successfully completes another impressive mission at 2000. After duly regaling those at the Officers' club with his exploits, he drives his "ensignmobile" back to the BOQ. He awakens at 0300 with severe pain in the left ear. The most likely cause of this pain is:
   a. An ear block caused by breathing 100 percent oxygen.
   b. An ear infection.
   c. A migraine headache.

Answers: 1.-c/ 2.-b/ 3.-c/ 4.-c/ 5.-a/ 6.-c/ 7.-b/ 8.-a



An ear block is undoubtedly the most common ailment in the aviation community, but the reasons for its occurrence and the proper treatment are widely misunderstood by both flightcrew and nonaviation designated medical personnel.

An ear block is a blockage of the Eustachian tube. The Eustachian tube is the only route for air entry into, or exit from, the middle ear (see diagram). It must function properly for you to be able to equalize pressure. The torus tubarus acts somewhat like a one-way valve at the lower end of the Eustachian tube. Air passes out of the middle ear without difficulty, but air entry into the middle ear is achieved with more difficulty. You've all experienced this; ascent is easy (air passively exits the middle ear with no effort on your part), but on descent you must yawn or wiggle your jaw or hold your nose and blow (Valsalva maneuver) to equalize. These actions mechanically force the "valve leaves" apart and allow air to enter the middle ear. Problems come about in healthy people who breathe 100 percent oxygen, or in people who fly with colds.

Colds cause inflammation and swelling of the tissues of the nose and throat, including the Eustachian tube. If the "valve leaves" swell, you may not be able to get them apart to clear your ear on descent, although they will almost always allow air out during ascent. Unfortunately, what goes up must come down!

The case of 100 percent oxygen is a little different. Air is 20 percent oxygen and 80 percent nitrogen. Oxygen is absorbed quite rapidly in the middle ear, but relatively little nitrogen is absorbed. After breathing 100 percent oxygen during a flight, the middle ear is filled with 100 percent oxygen which, if absorbed, results in a vacuum effect in the middle ear, and the walls of the Eustachian tube are sucked together.

In both cases, the result is a blocked Eustachian tube with a pressure gradient across the eardrum. It is the suction on the eardrum which causes pain, or possibly even rupture. Once such a situation is established, the suction can draw a glue-like fluid into the middle ear in a very short period of time. Once this fluid has been drawn into the ear, the reabsorption process takes time. You may be on the ground as long as 6-8 weeks waiting for this process to occur.

In any postflight ear block, time is extremely critical – an hour or two may make the difference between being grounded for a few days and being grounded for 6-8 weeks. Once you recognize an ear block, you must get to a flight surgeon or knowledgeable aviation medicine technician as soon as possible. The pressure must be equalized to prevent fluid accumulation and long term grounding. This equalization is most effectively done by politzerization – a 50-cent word for a method of forcing air into the middle ear to equalize pressure. This is the method alluded to in the alternate title of this article. The tube in question is connected to a machine which generates positive pressure, and is used to deliver this pressure to the Eustachian tube area via a nostril. A secondary device is the politzer bag. In experienced hands, this "squeeze bag" can frequently be effective. **Remember: prompt pressure equilibration is the only effective treatment for postflight ear block, and it is only effective if utilized before the pressure gradient draws fluid into the middle ear.**

Why, you might ask, am I addressing all of this information to you? Unfortunately, many nonflight surgeons do not understand the mechanics involved and the criticality of immediate politzerization. If **you** don't know what needs to be done, **your** ear block may not be appropriately treated, and **you** may be on the ground for 8 weeks for a problem that should have kept you down for only a few days.

In summary:

- Any postflight ear block requires **immediate** treatment.
- Treatments **must** equalize the pressure – politzerization being the best means.
- **Know** the mechanism of ear blocks and the proper treatment thereof; many nonaviation medical personnel aren't aware of either. ◄

NAVAIR Flight Clearances

By Glenn M. Smith
Naval Air Systems Command

THE term flight clearance has caused some confusion among pilots in the Fleet and field activities. Squadron pilots wanting to fire a missile, field activity engineers itching to fly their new electronics pod, and heavies eager to let their squadrons use a new weapon will all call the Naval Air Systems Command and ask: "Why do I need a flight clearance? I have to fly right away!" This article will give you some answers and show how a flight clearance can help you.

What is a flight clearance? A flight clearance is a NAVAIR message, or letter, or a NATOPS/TACMAN Interim Change concerning flight operation limits for an aircraft. It may change some existing Section 1, Part 4 NATOPS operating limits, or simply add more limits. Frequently, it will address external stores limits for a new or modified store. Confusing synonyms are: flight authorization, flight certification, and waiver. These synonyms have no consistent, clear definition and should not be confused with a NAVAIR flight clearance.

Why is one needed? Flight clearances provide the maximum safe operating limits for an aircraft or an aircraft/store combination. They are needed to prevent damage to the aircraft, prevent departure from the envelope, and keep the pilot safe. Early flight clearance requests get NAVAIR into the picture to head off safety problems early and avoid program delays. NAVAIR has many skilled specialists in the areas of aircraft structures, aerodynamics, engines, flight controls, flying qualities, etc., that can bring their years of experience to bear upon a particular aircraft structural modification, a new laser designator system for external carriage, or a new Air Force parachute flare needed for a Navy flare dispenser. Because of past experience with similar stores, NAVAIR can and frequently does save field activities from performing needless additional work on store modifications. We can also point out possible safety hazards early in the program so deficiencies can be corrected early – thus saving money and perhaps an aircraft or store.

When is a clearance required? In general, a NAVAIR flight clearance is required when any one of the following conditions occurs:

- A significant modification to the aircraft has been made or contemplated. It's definitely required when structural or flight control modifications are being considered.
- A modified external or internal store is to be carried. Limits aren't necessarily the same as those for the old store.
- A new store of any kind is to be used. Army or Air Force stores won't necessarily work on Navy aircraft or in a Navy environment.
- An aircraft and/or store is to be used beyond current TACMAN/NATOPS limits or in an area that TACMAN/NATOPS doesn't address.

Still not sure if your slightly modified electronics pod needs a flight clearance? Ask! Call NAVAIR's Flight Clearance Officer, LCDR Wayne Hanley, at Autovon 222-3547/8 or Commercial (202) 692-3547/8. ◄

NIGHT FRIGHT

By Maj V. L. McMinn, USMC
Naval Safety Center

A RECENT incident involving a helo brought to mind a few memories from my own past. The incident scenario was as follows:

It was a hazy night with little ambient light. A helo was on final approach to a landing zone. Just as I have done many times, this pilot turned on his landing light passing through 200 feet AGL and promptly lost all ground reference. His first approach terminated in a waveoff, as did his second approach. Persisting, his third approach culminated in a blade strike (trees) and an emergency landing in a different LZ.

The more I considered this incident, the more I found applications to my own experience. I remember the several missed approaches I shot trying to land in a sandy zone one night, never succeeding in touching down. I remember the recently mowed, grassy LZ landings and the first time I tried a night, snow landing. Also brought to mind was an IMC approach to minimums I executed one night. All these instances had one thing in common – the heart-stopping moment when the landing light was turned on and everything went grey outside.

After awhile, I began to ponder the occasions when I had landed in unprepared zones at night with relative ease, or at most, a little apprehension. Most of these landings were accomplished without using the landing light. Working in a section once, I had the wingman (higher and astern) illuminate the LZ with his spotlight. When I landed, he turned off his landing light and I turned mine on, thereby providing his ground reference. I remember using runway and/or LZ lights for closure information, and another night IMC approach when I detected the diffused glow of the approach lights through the soup long before I broke out.

My conclusion from all this was that it may not be advantageous to automatically reach for the landing light switch on short final. Several corollaries exist to this. Night landings should be practiced both with and without landing lights. All sources of light (ground lights, wingman's lights, etc.) should be explored. Experimentation with available light sources should be attempted to achieve the best light combination. But most of all, if the night and light conditions are such that you cannot maintain ground reference in the LZ, then perhaps the instrument approach pattern at home field is not so boring after all.

Life preservers for passengers

By CWO3 R. L. Wheeler, USMC
Naval Safety Center

THE Helicopter Emergency Information Cards published in Aug '76 by the Naval Safety Center (NAVSAFECEN 3730-1 thru -5) depict LPP-1 Flotation Device donning instructions and contain the statement, "Do not open pouch except in an emergency." This statement is contradictory to current prescribed procedures (NWP-42, Rev. D) and to the recommended procedures discussed below. It is requested that all holders of these Helicopter Emergency Information Cards delete this contradictory statement from their cards. A simple means of accomplishing this is with a typewriter eraser.

OPNAVINST 3710.7J requires that aircraft passengers wear inflatable life preservers during all flights originating from or terminating at aircraft carriers, landing platforms, nonaviation ships, or aerodromes in the vicinity of coastal waters. In addition, passengers in COD aircraft during shipboard launch and recovery shall wear protective helmets; passengers in rotary-wing aircraft shall wear head and ear protective devices.

The inflatable life preserver provided to passengers is the LPP-1 depicted in the accompanying illustrations. The most desirable method for wearing the device is to have it fully donned, and it should be so worn any time there is a question of sufficient time to don it. When passengers are wearing head and ear protection devices (normally the HGU-25/P cranial helmet), these items will significantly impede rapid preserver donning due to the small neck opening of the LPP-1.

To reduce handling and unnecessary wear, the Naval Air Development Center recommends that the LPP-1 be folded and stored in its pouch when not in use. This action can be accomplished by aircrewmen/plane captains, who must be familiar with LPP-1 preflight requirements and folding procedures as described in NAVAIR 13-1-6.1. A waiver has been granted for this operation and it does not require a repack CDI inspection or equipment history card entry.

Naval Air Development Center is preparing a forthcoming Aircrew Systems Change to provide a protective cover for the LPP-1 to replace the storage pouch. This protective cover will preclude wear and tear which could damage the flotation bladder.

In those unfortunate circumstances where utilization of life preservers is required, common sense dictates the flotation device be immediately available for use. Following these procedures should eliminate any delay in their availability.

LPP-1 Flotation Device

DO NOT OPEN POUCH EXCEPT IN AN EMERGENCY

Fasten belt in front with pouch in rear

1.
2.
3

LPP-1 Flotation Device

Fasten belt in front with pouch in rear

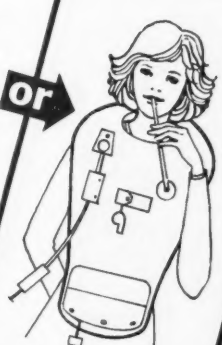
Rotate pouch to front

Remove vest

Slip vest over head

Inflate by pulling toggle down

or



To inflate by mouth, unscrew and depress mouthpiece.

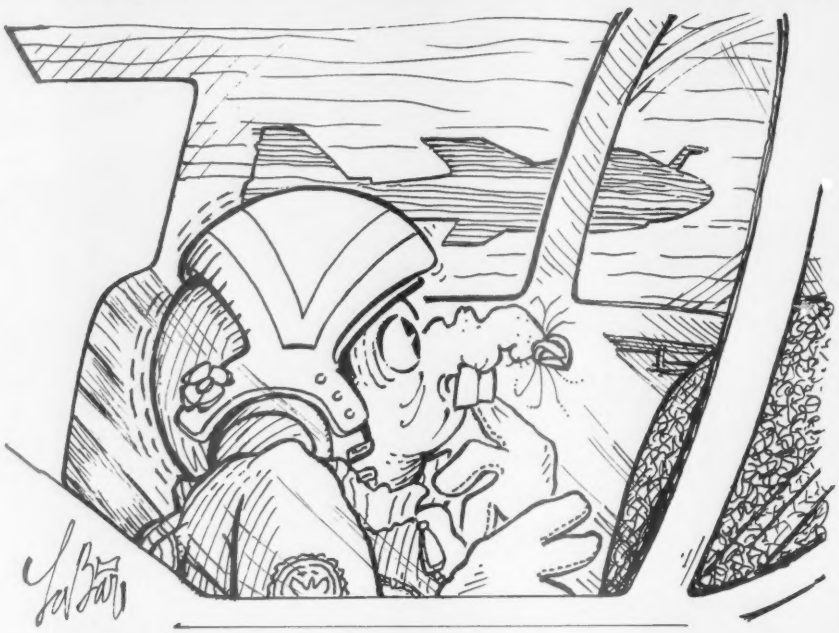
1. OBEY AIRCREWMAN.
2. DON'T PANIC.
3. STAY SEATED WITH SEAT BELT FASTENED UNTIL ROTORS COME TO A COMPLETE STOP.
4. IMPORTANT! DO NOT INFLATE FLOTATION DEVICE INSIDE AIRCRAFT.

AIRCRAFT EMERGENCY EQUIPMENT

• Survival Kit • First Aid Kit

• Life Raft • Fire Ext

Anymouse



Enough Is Enough

IT started out as just another pitch black, no moon, marginal weather, night CV launch; it almost ended up in disaster. Our EA-6B *Prowler* was to accompany a flight of three A-7s and two A-6s on a simulated practice strike on some small shoals some 175 nm from USS CV, near Ryukyu Island. Since there were no friendly electronic warfare threats to work against, our EA-6B mission and profile was to be accomplished by simulation. At first glance, the lead's brief of join-up and en route procedures seemed fairly routine, but 12 years of flight experience told me that a five- to six-plane night formation was anything but! As I briefed my crew, I tried to prepare for all contingencies, including night IFR formation and midair emergencies – caution and safety considerations were paramount. All players except one A-6 were successfully launched and proceeded to the prebriefed rendezvous circle. Multiple cloud layers ensured that little to no depth perception was available, and disorientation/vertigo had to be combated with a good instrument scan. After 30 minutes, and when all aircraft had "joined," the flight proceeded en route to the target area at FL260. Twenty minutes later, things seemed to be settling down as the lead accelerated to 300 KIAS and contacted the appropriate Ryukyu Island controlling agency. Slowly but surely, the weather deteriorated. A call was made to Island Control to request a lower altitude, to possible VFR underneath. We closed to IFR parade as all five aircraft entered intermittent IFR conditions. I closed to tight parade on the A-6's starboard wing and broadcast on the ICS for all eyes out of the cockpit (as if they weren't anyway). The pucker factor was way up by this time. We encountered light turbulence and intermittent IFR so heavy that I visually lost the A-6. (The next 10 seconds of flight seemed to have happened in slow motion in my mind.) About 2 seconds later, the A-6 popped back into view and we had separated by about 10-15 feet. I immediately started to close, but just as quickly lost him again. I made no corrections and held what I had, hoping he would come back into view and everything would be okay. In the next instant, he came back into view and we were closing. I corrected. By this time, my knuckles were probably white from squeezing the stick and throttle. I thought to myself, "Just a little longer and we'll break out underneath." Then I lost him again – and I was flying tight! That did it. In the next few milliseconds I thought how stupid all this was and how APPROACH, my three children, my wife, my crew, and my CO would have felt about this one. Common sense prevailed. I broke it off 30 degrees to the right and started an immediate climb. As I climbed to a safer altitude and away from the other aircraft, I broadcast to the lead, "Lead, 624 has broken it off – we're RTB." That was probably one of the smartest decisions I made in 12 years of jet, naval aviation. I may have pressed it a little too far, but I had planned well ahead, prepared the crew, and knew what I was going to do in advance. The lesson is there – multiplane night formation is dangerous. Know your minimums, plan ahead, and stay alive.

Commonsensemouse

The purpose of Anymouse (anonymous) Reports is to help prevent or overcome dangerous situations. They are submitted by Naval and Marine Corps aviation personnel who have had hazardous or unsafe aviation experiences. These reports need not be signed. Self-mailing forms for writing Anymouse Reports are available in readyrooms and line shacks. All reports are considered for appropriate action.

REPORT AN INCIDENT
PREVENT AN ACCIDENT

Everyone's Doing It!?

I HAVE watched my squadron give lip service to safety for 2 years. This year's safety standdown scheduled for the maintenance department was similar to last year's. Our schedule was as follows: 0730-1200 – a series of safety lectures for all hands; 1200-1300 – lunch break; 1300-1600 – maintenance worked on aircraft. The next day we were split into three groups. From 0730-0930, day check was given safety lectures and then worked on aircraft until 1600; night check worked on aircraft from 1600 'til 2400, with safety lectures from 1700-1900.

The result of a 2-day safety standdown was a total of a half-day of safety and a day-and-a-half of maintenance. When I'm told that safety is No. 1 in the maintenance department, yet only 6 hours out of 2 days are devoted to safety, I feel they are just saying the words.

What seemed even more ridiculous to me was that, 2 days after the safety standdown, we had an accident in which a man was seriously injured, and his supervisor had the gall to say he should have been more aware because of the 2 days of safety we had just completed!

The reasoning behind the shortened standdown was the same as always – maintenance must be done so we can meet our commitments. If anyone questions the procedure, we get the worn-out excuse that **everyone else does it.**

This will probably continue. The only way to stop it is to make everyone from the CO on down aware that **we are everyone else.** The cutting of corners must stop with us before it can be stopped anywhere else. Now that my eyes are open, it's hard to work in an organization that always tries to make points by cutting corners. If what I have been told is true, and everyone else is doing it, I'm wasting my time, because it is a problem no one can or will fix. Also, I'm wasting my time in the Navy, because I can't work in a fly-by-night outfit and keep a clear conscience that I have done my best.

Can'treadlipsmouse

• Thankfully, not all squadrons operate in such a poor fashion. If yours does, change it. Otherwise you'll be reading the results in an AAR or incident report.

Good Grief!

THE scene is a Mid-Pac base ops. Two crews were flight-planning. A long range crew heard a short legged crew discussing a max range mission.

"But what if they won't clear us to FL310?" says the copilot.

"Don't worry about it! If they clear us to FL280, we'll just climb to FL310 and report at FL280," said the aircraft commander.

Luckily, the copilot didn't hesitate to verbalize his disbelief. The groans of the long range crew were loud and clear, and the clearance came through for FL310 . . . **But what if?**

I thought everyone knew better and that no one even thought things like this anymore!

How about your comments on this accident waiting to happen? Obviously, there's at least one dummy on the loose who still believes in the "Big Sky Theory."

Tankermouse

• You've said it all. We just hope the "dummies" are listening!

Complacency

LAMPS operations have been conducted for the better part of a decade, and forward deployed Fleet units are still committing basic safety violations. These violations can't be due to a lack of knowledge; the doctrine is too well known. They can only be due to lack of attention to detail – a sure killer in naval aviation.

Consider the following examples on a LAMPS ship in the Med with a detachment embarked:

- On a routine landing, the tower advised, "The winds are out of the envelope. Do you want to land, or should we change the winds?"
- The LSE brought us aboard and was not wearing goggles. Further, he was wearing a short-sleeved shirt.
- The fire party was casually dressed in short-sleeved shirts and had no safety shoes.
- Fuel was pumped without taking samples.
- The chainmen couldn't operate bullheads.
- The helicopter was chocked and chained, or chocks and chains were removed, without a signal from the pilot.

How much longer will we get away with these violations? Is our luck about to run out?

Concernedmouse

Off the

TWO pilots, an instructor and a student, were shooting a GCA in their TA-4J. The handoff to GCA was normal and the Scooter's position looked good on the precision radar scope. At about 4 miles on final, however, the target suddenly disappeared into the bay.

The GCA controller alerted the tower immediately and the SAR wheels were put into motion. The SAR pilot, who was also the SDO, heard a call on CB channel 9 that there had been a crash into the bay. He hit the alarm, turned over the duty to another pilot, and manned the helicopter. The crew was airborne and headed for the scene within minutes.

The No. 2 SAR helo launched at almost the same time and followed No. 1 into the area. The time between the crash and the arrival of the SAR birds was just over 10 minutes.

SAR No. 1 assumed the duties of primary rescue vehicle. The HAC requested the aircraft overhead (it had been following the TA-4J on GCA) to depart. He then began an approach to a small fishing boat with two fishermen in it. The crew had ejected from the mishap TA-4J, and the fishing boat had been first on the scene. One of the fishermen was in the bow of the boat holding onto the instructor to keep his head above water. The instructor had his helmet on, but his head was slumped over, low on his chest.

The HAC lowered the hoist cable to the fisherman, who attached it to a strap on the instructor's chest. The fisherman tried to hook the cable to the harness fitting, but the rotorwash was too much for him. He watched the instructor being hoisted as the helo moved off to the side. The helicopter crewman began raising the body out of the water, but the chute surfaced and began to balloon. The crewman told the HAC what was happening and asked if the pilot wanted him to hit the guillotine. The HAC told the crewman to hold it and that he would land in the water. The chute billowed up and covered the tail rotor, but the HAC managed to land gently. The surface was calm, and the HAC shut down immediately. When the rotors had ceased turning, the crewman and the copilot pulled the instructor inside the helo. Unfortunately, the instructor was already dead. The fishermen then took the crewman back to the tail rotor to disentangle the chute, and the HAC called back to base and requested a boat to come tow him in.

The No. 2 SAR crew and another fishing boat continued searching for the student until dark. An EOD/salvage team was flown in and spent the next 2 days trying to locate the wreckage and the student's body. On the third day, the main

wreckage was found and marked by a buoy. The operation had to be stopped for 3 days, however, due to extreme adverse weather. Finally, the weather abated and a search was continued.

On the seventh day, about 75 percent of the wreckage had been recovered and the student's body was found. When the student's body surfaced, it was found with shoulder and lap harnesses released, but without an LPA. The student had removed the LPA from his SV-2 the evening before the flight. He had become entangled in his chute and drowned.

The fishermen reported that they were watching the TA-4J pilot shoot his approach when suddenly the aircraft pitched up, rolled, and dove into the bay with the engine apparently at full power. At some point (various estimates

scope

of height), the pilots ejected. The instructor's chute didn't open, but the fishermen saw the student's chute blossom. Both pilots entered the water at the same time. The fishermen immediately stopped what they were doing and headed for the nearest crewman. They maneuvered their boat towards the instructor, who couldn't be raised into the boat, and grabbed him and held his head above water. The student did not reappear after he entered the water.

The cause of the aircraft's sudden and radical departure from the glide slope could not be determined. However, there was no legitimate reason for the student not to wear the required LPA. Both the instructor and the student knew that their route would take them over water. Even though there was a shortage of LPAs in the squadron, there were spares readily available for checkout from the paraloft. It is quite possible that the student would have survived had he adhered to the LPA requirements of OPNAVINST 3710.7J. Once again, this proves that shortcuts and safety don't mix.

The performance of the SAR crew in this mishap left something to be desired as well. Had the instructor survived the ejection, the rescue procedures used by the SAR crew (non-Navy) might have precluded a successful rescue. A swimmer should have entered the water to ensure the instructor was free of his chute and was properly hooked up for hoist. Also, the hoisting should have stopped as soon as it was evident that the chute was still attached to the body. Had this occurred in the open ocean, someone would have had to rescue the SAR crew! ◄

TAIL ROTOR TRICKERY

By Maj J. P. Cress, USMC
Naval Postgraduate School

TURN to the *Emergencies* section in the operator's manual of any conventionally driven, single-rotor helicopter and you'll probably find a reasonably good discussion of what to expect and what to do if you lose control of tail rotor blade pitch, if you lose tail rotor drive, or if the whole tail rotor and gear box(es) fall off! Depending on the problem, the book will advise a broad range of expectations and corrections varying from "controlled power landing techniques . . . will enable . . . a safe landing on a good surface" to . . . "it is recommended that the helicopter be abandoned in lieu of landing, if parachutes are available."

You'll no doubt agree that these kinds of problems, mechanical in nature, are those that come to mind when you talk tail rotor troubles. But is this the whole story? Does something have to break in order to cause you trouble with your tail rotor? You'll agree that there are lots of ways to get yourself into difficulties with the main rotor, short of breaking something off it. Since the tail rotor is a lift or thrust producer somewhat similar to the main rotor, it's not unreasonable to assume that it can create aerodynamic headaches similar to the blade stall and power settling problems we associate with the main rotor. What are some of these problems? When do you run into them? How do you avoid them or correct for them?

If you think back on what you know about main rotor aerodynamics, you'll agree that one of the scarier problems that comes to mind is power settling, a term you'll find various authors using to refer to flight in the vortex ring state. It becomes troublesome when descending at low forward speed with the rate of descent within about 70-150 percent of the average induced velocity of the rotor. The phenomenon is often described as a case of settling into your own downwash. The result is a large thrust variation, vibration, and reduced control effectiveness, as well as rapid loss of altitude.

How do you put a tail rotor in such an environment? It should be clear that left sideward flight can cause the tail rotor (for a conventional American design) to operate in a condition much like the main rotor during power settling. Though it doesn't settle *per se*, left sideward velocities (10-35 knots, depending on loading) due to wind or control deflection can cause the tail rotor to work in its own downwash, provided the fore/aft wind components are light. As might be expected, the results will be large variations of tail rotor thrust and difficulty in maintaining directional control, with the nose oscillating while the pilot attempts to counteract with rapid left/right pedal inputs.

The problem was of sufficient proportions in two fairly recent, high technology helicopters to limit one of them to 15 knots of left sideward flight and to force redesign of the tail rotor of the other. This would preclude a problem where, at high gross weight and density altitude with light port winds, the pilot would find the aircraft yawing right after left pedal input due to operation of the tail rotor in the vortex ring state.

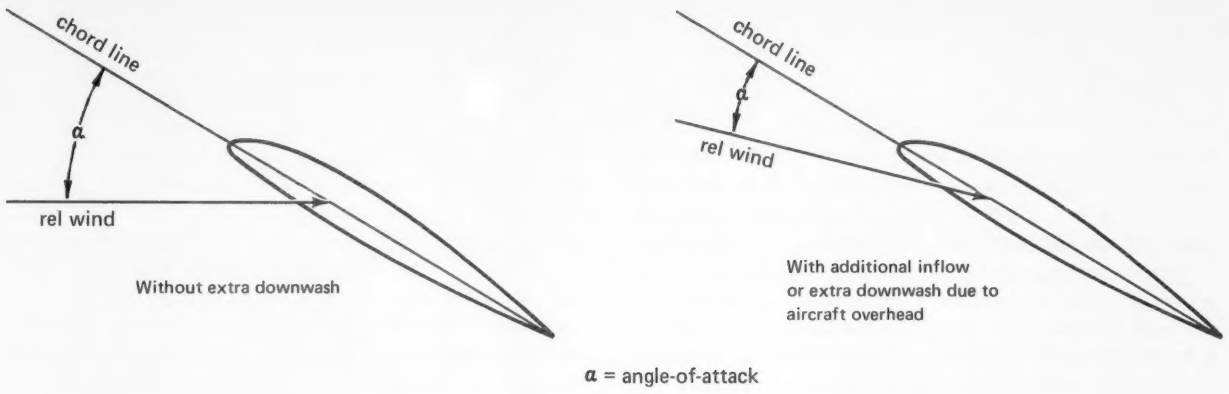


Fig. 1

What about starboard winds or aircraft motion to the right? This affects the tail rotor in the same manner that a downward gust would affect the main rotor. The reason, of course, is because the inflow, or downwash, reduces angle-of-attack (a) as shown in Fig. 1.

Again, a tail rotor in right sideward flight or with wind from the right experiences a similar reduction in angle-of-attack and loss of tail rotor thrust. Unless the pilot counters with left pedal (greater tail rotor pitch), the aircraft will tend to weathercock into the wind. As the aircraft is flown at higher gross weight, density altitude, higher right sideward velocity, or in stronger starboard winds, full left pedal may be commanded by the pilot. Initially, this can result in excessive tail rotor power demand, possibly causing settling and an uncontrolled nose-right rotation. If the tail rotor controls lack stiffness and a given set of rotor blade structural criteria are met, the tail rotor may enter a complicated condition sometimes called *buzz,* in which tail rotor blade spars are coned and twisted to the point where blade pockets are stripped from the spars. Tail rotor *buzz* resulted in the loss of several helos of one particular model prior to tail rotor modifications to correct the problem.

Did you ever notice that your single-rotor helicopter becomes a bit squirrelly in yaw when in rearward flight or with wind on the tail while near the ground? NASA and various contractors have spent considerable effort in looking at pilot complaints of such problems in several different helicopters. These studies have uncovered an interesting phenomenon which has become known as the ground vortex. As the name implies, the problem only becomes a factor when the aircraft is operated at low-wheel (or skid) heights, where the main rotor tip vortex can act with wind to produce an area of extreme rotational turbulence near the tail rotor (or main rotor, with headwind), as shown in Fig. 2.

As the figure implies, winds tend to contain the region of vorticity created by the shed vortex from the main rotor and may actually blow this region onto the tail rotor (or, of course, the pilot may back into it). When this occurs, the aircraft may become very skittish in yaw, necessitating large and rapid pedal inputs from the pilot in order to maintain heading. While the problem seems to occur in a narrow tailwind speed range of 10-20 knots, protracted flight under these conditions can be fatiguing and clearly hazardous.

It is interesting to note that the ground vortex located near

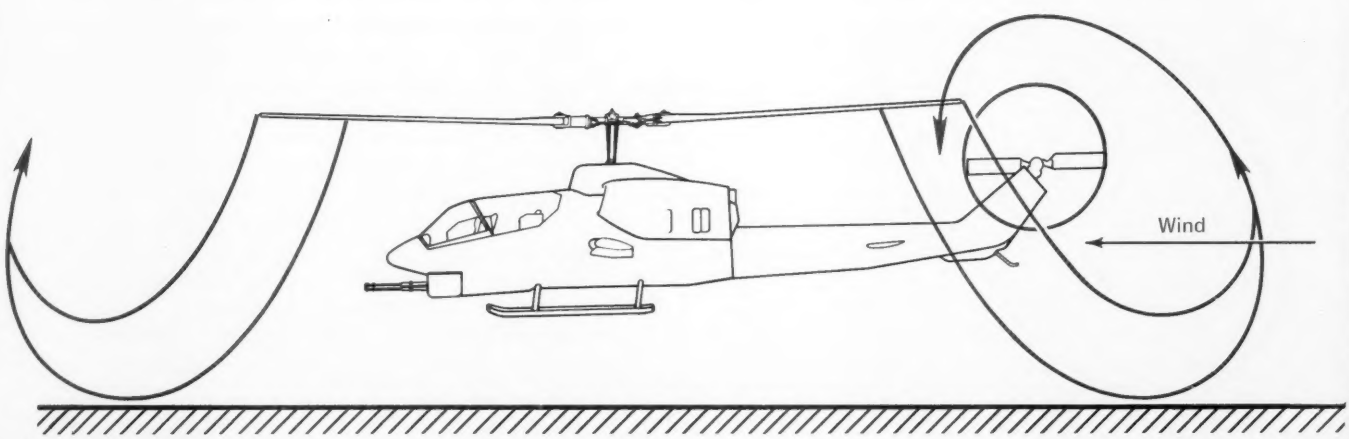


Fig. 2

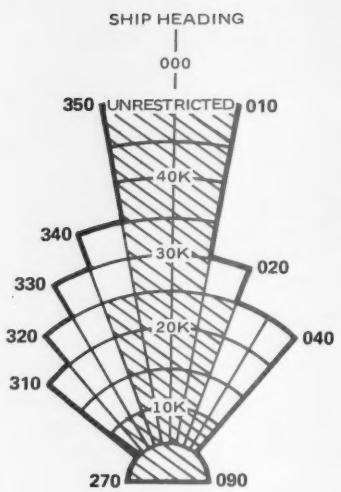
the tail rotates counterclockwise when viewed from the left, as shown in Fig. 2. As you might expect, if the tail rotor turns in the same direction, a relative reduction in velocity over the tail rotor will occur when it operates in the vortex, further compounding problems with directional control. As a result, one manufacturer in particular has changed the direction of rotation of the tail rotor on newer helicopters to reduce problems with the ground vortex. If your helicopter's tail rotor turns counterclockwise (as viewed from the left), you may want to keep a closer eye on this problem of tail rotor/ground vortex interaction with tailwinds or during rearward flight.

More tail rotor trouble, again related to the direction of the wind, results when the tip vortices, shed from the advancing side of the rotor disc, impinge directly on the tail rotor. While many variables influence this effect, the things to remember are: with winds 040 - 090 degrees relative, you can expect that this problem will first make itself known at wind speeds of about 20 knots; the loss of tail rotor thrust and increase in tail rotor power required which result from this tail rotor-main rotor vortex interaction was found, in recent contractor research, to have a greater effect on tail rotor performance than any of the other aerodynamic factors mentioned here; and, it was found that winds at 040 - 090 degrees relative are the most critical angles in limiting tail rotor performance.

This probably comes as no surprise to those who spend a good deal of time aboard ship where wind velocities and the tempos of operations run high. These two factors and the perceived limitless versatility of the helicopter in the eyes of those unfamiliar with it can lead to requests (or demands!) for launch and recovery operations in unsafe wind velocity/azimuth combinations. Many of the tail rotor limitations described above are reflected in a typical (single rotor) launch/recovery envelope, shown in Fig. 3. Armed with a chart like this, and with an understanding of why it looks the way it does, you should have no trouble declining an invitation to launch 'em with relative winds 060/20 (for instance) the next time you're asked!

In addition to comments and/or charts concerning launch/recovery winds in your manual, you'll often find at least one other comment dealing with tail rotor aerodynamics, though perhaps you hadn't thought of it as such. Ever see a statement like "directional control becomes marginal if rotor RPM decays to ____ percent N_r/N_f," or ". . . tail rotor thrust may be insufficient at low rotor speeds"? As every nugget knows, lift or thrust varies directly as the square of velocity. In a rotary winged machine, velocity means rotor RPM. Now, what does this all mean?

Well, let's suppose you're hovering at maximum gross weight. It's a hot day and the density altitude is high. You



DAY: ENTIRE ENVELOPE
SPOTS 1, 2, 3, 4, 5
NIGHT: HATCHED PORTION
SPOTS 3, 4, 5
0-3 DEG SHIP ROLL

Fig. 3

latch on to an external load at the upper limit of the aircraft's capability for these conditions. As you lift, you note a loss of RPM to 100 percent; indicated torque is as predicted from your pocket checklist. Due to relatively high engine power output and thinner air, you find the left pedal just about on the stop. You add a bit more collective and, though pedal position remains unchanged, you note an RPM loss to 95 percent as the load breaks ground and a slow, uncontrolled nose-right rotation begins. Clearly, tail rotor thrust (though the tail rotor blades were at or near maximum pitch) was insufficient to counter main rotor torque as a result of a number of factors. What are they?

First of all, if maximum engine torque output had not already been reached, increased collective resulted in greater rotor torque and, therefore, a demand for greater antitorque from the tail rotor Secondly, since the left pedal was near the stop, the need for greater tail rotor thrust could not be met with increased tail rotor pitch. Even if it could, however, the result would have been increased power demand by the tail rotor on an aircraft already lacking sufficient power as evidenced by drooping rotor speed. Thirdly, since a reduction in main rotor speed of 5 percent necessarily means a 5 percent reduction in the speed of everything tied to it, the tail rotor also droops five percent. Since the tail rotor thrust varies

directly as the square of the RPM, a drop to 95 percent means nearly a 10 percent reduction in tail rotor thrust, assuming pedal position is constant. The result can be a helicopter spinning like a top. This has happened at least twice over the past 2 years in Navy/Marine Corps aviation at a cost of two airframes and numerous fatalities. Let's hope we can wait at least a few more years before we once again prove this already well established law of helicopter aerodynamics.

Let's review briefly what's been said over the past few pages:

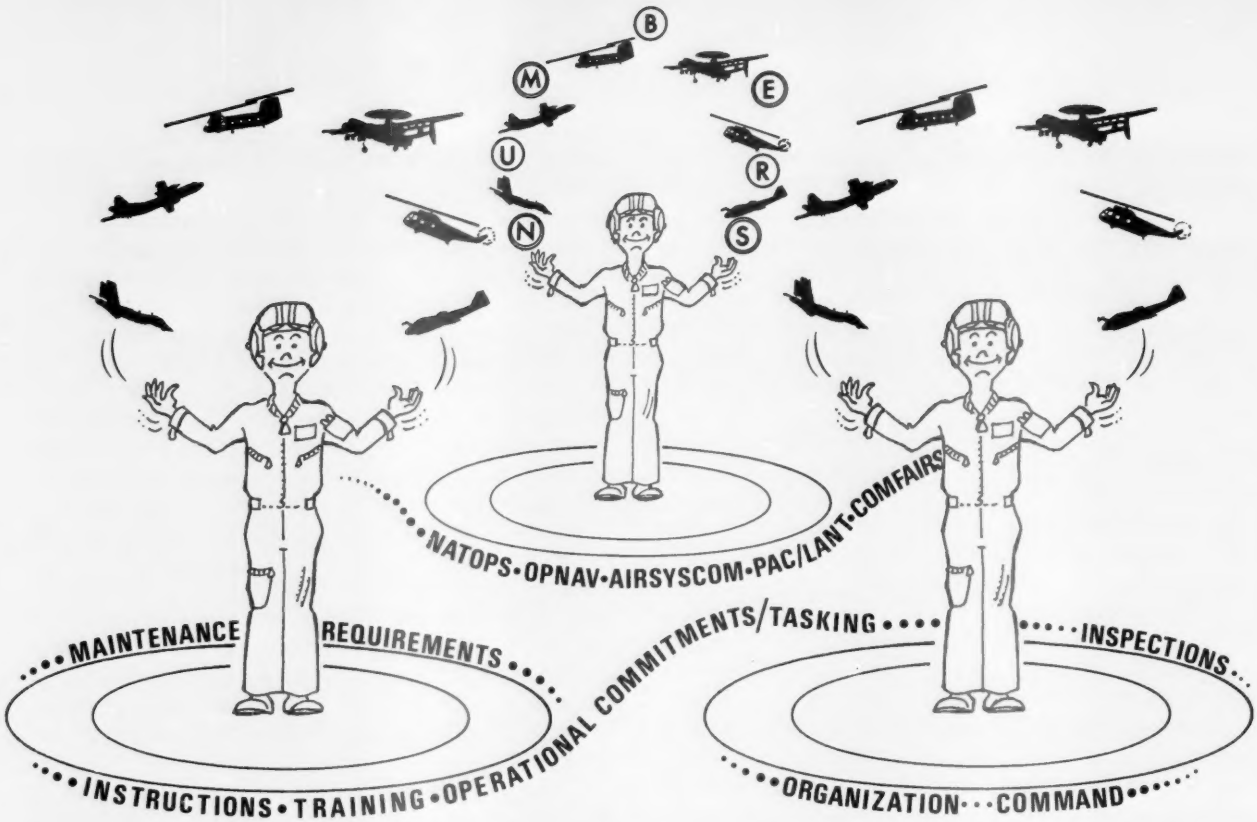
- Tail rotors can be placed in a vortex ring state during left sideward flight, or with a port crosswind, just as a main rotor can be subject to power settling. While the conditions will vary somewhat from aircraft to aircraft, velocities from the port to the left rear quarter at 10-35 knots can lead to this problem.
- Winds from the starboard, or right sideward flight, cause a reduction in tail rotor blades' angles-of-attack, necessitating increased left pedal input (American design). Pedal stops may be reached with loss of yaw control.
- Winds on the tail or rearward flight at low speed (10-20 knots) may cause the tail rotor to operate in the ground vortex with a resultant loss of tail rotor thrust and increase in tail rotor power required. (This is a particular concern with *pusher* tail rotors rotating counterclockwise when viewed from the left.)
- With wind speeds on the order of 20 knots (or higher) in the range of 040-090 degrees relative, blade tip vortices may impinge upon the tail rotor, causing loss of tail rotor thrust and increased power consumption.
- Drooping rotor RPM, with the left pedal near the stop, can cause loss of directional control primarily due to the rapid loss of tail rotor thrust (varies as the square of RPM) as RPM decays. Resulting nose-right/tail-left motion will tend to increase tail rotor blade section angles-of-attack, possibly leading to stall. This would, of course, mean a greater thrust loss and power required increase.

Newscaster Harry Reasoner once said: "A helicopter does not want to fly. It is maintained in the air by a variety of forces and controls working in opposition to each other, and if there is any disturbance in this delicate balance, the helicopter stops flying, immediately and disastrously." The tail rotor produces one of those "forces . . . in opposition" which provides for the "delicate balance." Knowing what to expect, both *of* the tail rotor and *from* it, could certainly have saved us some *thought-I-coulds* in the past and can surely underwrite some *can do* in missions yet to come our way.

(Author's note: Much of the technical material included in this article was derived from materials published by the American Helicopter Society. Those relied upon more heavily were: "Tail Rotor Performance in the Presence of Main Rotor, Ground, and Winds," by Wiesner and Kohler, which appeared in the July 1974 issue of the *Journal of American Helicopter Society*, and "Tail Rotor Design, Part 1: Aerodynamics," by Lynn, Robinson, Batra, and Duhon which appeared in the October 1970 issue of the same journal.)

In reviewing this article for APPROACH, Mr. Herm Kolwey, an aerodynamics expert in the Naval Air Test Center's Rotary Wing Division, had the following comments:

For shipboard helicopter operations, flight envelopes are developed for degraded modes, i.e., AFCS Off, Boost Off, etc. For shore-based operations, the pilot should possibly consider a reduced envelope when experiencing a combination of conditions with respect to the tail rotor. For example, if you are a) heavy, b) AFCS Off, or c) have a high drift angle, don't accept adverse winds or downwind approaches. Also, in the same conditions, don't combine functions such as lifting off and simultaneously turning right. ◄



THE NUMBERS GAME REVISITED

By AMCS Gerald G. Lenhardt
VP-9

AS I am about to end a 20-year career, most of which has been in naval aviation, I happened to read the AUG '79 APPROACH and spotted two articles relating incidents which occurred in my squadron printed in the same issue, plus a third article by VF-23's LCDR Parker entitled "The Numbers Game." Although I have never met the author of this excellent article, I feel that he must be in what is now a typical squadron.

Many of us have been exposed to articles about the *how, why, what,* and *proposed solutions* to problems concerning aviation safety, NATOPS, maintenance instructions, training, and a multitude of other programs which are designed to enhance the man and his machine. Let's take a quick trip into the real world as I see it.

I am the Quality Assurance supervisor of a deployed VP squadron that is loaded with *can-do* spirit. The items that I am about to address are not isolated to VP types, but are common to all squadrons with which I have ever been associated.

First, we are all subjected to OPNAV, AIRSYSCOM, PAC/LANT, COMFAIRS, wing, station, and finally, local instructions, all of which at one point or another add requirements to the previous authority. The **numbers** game officially starts here.

Second, the training requirements for aircrew and ground personnel, officer and enlisted, are laid down by experts who appear to be in a world of their own and not fully aware of what squadron commanding officers are actually working with: attrition, closed loop detailing (the **numbers** are there; the experience "in type" isn't), TAD requirements that were set when everybody was "fat" with people, and a more complex aircraft that requires a massive amount of logistics and man-hours to maintain.

Third, what seems to be unessential operational commitments/tasking from higher authority, especially in the VP community, constitute many of our high priority flights. These would make a VR squadron turn green with envy. Of course the tasking isn't an unreal request, as the morning status report reflects an abundance of aircraft in excellent condition. The maintenance chief is a little nervous,

but what the hell, these are airplanes, not ground planes. Again, the **numbers** game appears in the picture, only this time we have added the ever popular percentage point.

Fourth, is the maintenance officer playing the **numbers** game too? Let's see. Utilizing the plus or minus 72-hour time frame, is it really possible to pull a 7-day inspection 3 days early and pull the 14-day inspection 3 days late? The answer is yes. Of course with the high priority tasking mentioned earlier, we are legal. The fact that by the third week we have exceeded the 7-day requirement by 6 days never enters the picture.

Fifth, is the commanding officer really aware of just what it takes to get an aircraft capable of performing its primary mission into the air safely? You bet he is . . . or is he? Talking safety and practicing safety all the time are, unfortunately, worlds apart. It seems like we only get priority-one tasking requirements, and several a day at that. Is there much (if any) difference between a crew rest violation and working a maintenanceman over 24 hours straight? The end result will sooner or later make headlines in the *Weekly Summary*.

Sixth, do the department heads ever really listen to experienced enlisted personnel when informed of a violation of the MIMs? Is the attitude that of "We've been doing this for 5 or 6 years and *they* said it was OK"? Has anybody ever found *they*? The numbers of *they* on active duty must be staggering.

Seventh, how's your documentation? From my end, it has become an *advance-to-the-rear* paperwork drill. There is always someone upstream who comes up with another form, rarely deleting any, but adding more **numbers** of forms that are usually redundant in information and always filled out 2 weeks prior to ADMAT/Predeployment Inspection.

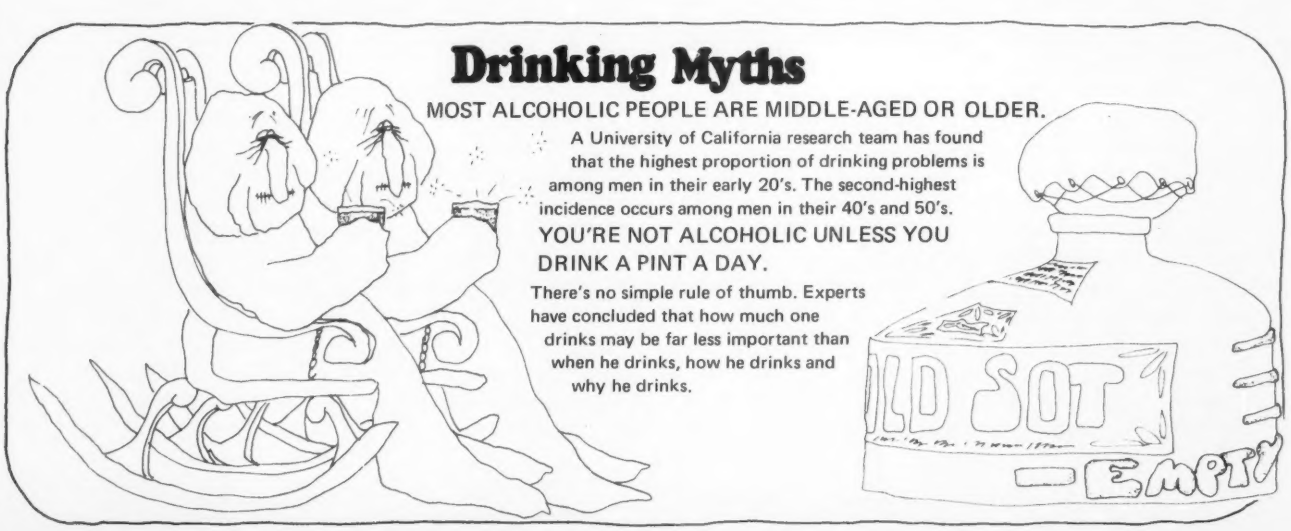
Eighth, "**numbers** of items cannibalized must be drastically reduced." That is a quote from "higher authority." Now, any maintenance chief worth his salt will reduce the **numbers** to satisfy the system. What he is actually going to do is discover the needed part against a down aircraft and rob it anyway. On paper, we have reduced cannibalization; everyone is happy. The **numbers** have again been massaged.

Ninth, I wonder what would happen if the people who write the training requirements were to have a conference with the people that determine the manning levels and the people who task the aircraft. Maybe they would have beginner's luck at basic, realistic requirements. However, the people who purchase the illusive replacement parts would need to have their say, too. The end result would produce a more realistic picture of what we have to work with to accomplish our respective missions.

Would our aircrews have a safer aircraft to fly? Would the maintenanceman whose opinion is solicited develop an attitude of professionalism and pride? In my opinion, the answer is yes! If the realistic requirements do not materialize, assigned personnel will acquire an unhealthy attitude, probably by example, with the justification that we want to log 150 more hours than anybody else, get 30 more traps than brand X, or complete any other self-serving project.

I am not saying, nor will I attempt to, that everyone in naval aviation is subjected to all of these items. However, if you can say that none of this article applies to your squadron, you are indeed fortunate. If you can pick out a few incidents that have happened in the past within your current command, welcome to the real world of *can-do*. Nothing is impossible for those who don't have to do it.

Although I sound negative, I am not. I have survived the system. You must remember that I started correcting aircraft discrepancies on one piece of paper, and now, the weight of the paper must equal the weight of the aircraft prior to being certified safe for flight. I must also add that *you ain't seen nothing yet* until you release an aircraft for flight and it doesn't come back. Some survived, five didn't. Now there are some **numbers** that really mean something! ◄


Drinking Myths
MOST ALCOHOLIC PEOPLE ARE MIDDLE-AGED OR OLDER.
A University of California research team has found that the highest proportion of drinking problems is among men in their early 20's. The second-highest incidence occurs among men in their 40's and 50's.
YOU'RE NOT ALCOHOLIC UNLESS YOU DRINK A PINT A DAY.
There's no simple rule of thumb. Experts have concluded that how much one drinks may be far less important than when he drinks, how he drinks and why he drinks.
EMPTY

PRO and CON

By LCDR David W. Anderson
VA-85

AUTHOR Richard Bach, in a book titled *Stranger to the Ground*, expressed some emotional thoughts about the F-84F *Thunderstreak* which he was flying in the Air Guard. He wrote, "I call her she . . . Because I love her . . . I love her more than I would tell to anyone who asks . . . So many people think that she is just a block of aluminum and glass and bolts and wire . . . but . . . she truly is a living thing . . ."[1]

As aviation designated officers, we have all heard since primary flight training that feeling emotion about our aircraft is not a healthy thing. We were told never to attribute qualities of animation or attach feelings of affection to the machines for fear that they would affect our judgment. Perhaps that voice of experience we heard was absolutely right. However, there is some fallout from that attitude that may be undesirable.

There is an image in the American idiom of a spoiled young child who is bombarded with expensive and sought after belongings. The child has no appreciation for the value of the belongings that are given to him, and he mistreats them. That image may be present with us in naval aviation.

The evidence is around us. A plane captain flogs the side of a jet with a tiedown chain because he bumped his head on a bomb rack in an inattentive moment. Through poor checklist technique, a crew forgets to lower the landing gear and lands gear up. Another crew, unwilling to follow procedures, raises the flaps with a BLC light and damages the wings with hot bleed air. These types of incidents could be indicative of improper motivation and a lack of appreciation of the investment the country has in the equipment we use.

Realization of a few facts may cause us to develop new attitudes about emotional attachments to our inanimate machines. They are, after all, unique creations with no similarity to those of any other armed force. Most significant is the fantastic expenditure of money made to fund their development, production, and maintenance. No parallel exists anywhere. The BBC called it an "extensive national fortune."

Some intangibles are also tied up in the aircraft. The creative genius of the designers, the long hours and dedication of the RDT&E field activities, the large support staffs, and logistics commands are all taken for granted. To be less than ruthlessly professional in flying our aircraft is an unforgivable betrayal of the trust of the people who gave us those aircraft. After all, we built these machines at great cost to defend our country, and it is illogical and spiteful to mistreat them or employ them in a less than fully effective manner. The next time you look at your "block of aluminum," try to see the effort it took to put it there.

Bach loved his *Superhog* because of the freedom he felt while flying. We are beneficiaries of that same sense of freedom, but perhaps our emotion ought to be a profound respect for our aircraft, extracted from a realization of what they mean to our country. The bottom line is more personal, and once again, Bach put it best: "But if I continually force her to fly as she was not meant to fly, overspeed and overtemperature, with sudden bursts of throttle, with hard instant changes of flight controls, she will one day, coldly and dispassionately, kill me." ◄

Reference

[1] Richard Bach, *Stranger to the Ground* (New York: Harper and Row Publishers, Inc., 1963).

BRAVO ZULU

Capt Barry Knutson
Capt Earl Hacker
Marine Air Weapons Training Squadron

AFTER a routine brief and departure from MCAS Yuma, Capt Barry Knutson and his RIO, Capt Earl Hacker, along with their wingman, began an ACM engagement on the Yuma ACM Range. Soon thereafter, they encountered a most physically and mentally demanding emergency, one which required all of their aviation skills to overcome.

Turning his F-4S *Phantom II* from 18,000 feet to engage the bogey, Capt Knutson executed a 70-80-degree, nose-low turn at 400 knots. As he began to maneuver out of the turn, he immediately realized that the stick was jammed to the left and would not respond to normal lateral inputs. As precious altitude was lost, and anxious seconds passed, Capt Knutson began to doubt whether he could recover the aircraft. However, using rudders, speedbrakes, trim, and as much muscle as he could muster, he managed to overcome the control problem temporarily and return the aircraft to the level flight. Once slowed down, his attempts to free the jammed controls again proved fruitless.

While en route to the field, Capt Hacker briefed the tower on their situation, as Capt Knutson began the task of conducting a controllability check to determine if the aircraft could be flown safely enough to attempt a landing. By using opposite rudder and trim, he found that he could alleviate the constant left turn problem somewhat, and that he could, for a few seconds at a time, hold the wings level. As he was becoming extremely fatigued at this point and the true test of the landing was yet to come, he decided not to conduct any controllability checks with the flaps, in order to expedite the landing.

After having fully discussed the type of approach to be flown with his RIO, Capt Knutson set up for an angling approach, planning to roll wings level just prior to touchdown. The approach was flown exactly as described, and a flawless landing was made at MCAS Yuma.

Subsequent inspection of the flight controls revealed that the right wing fold cable conduit was misaligned and was binding on the right lateral control bellcrank. As the left spoiler was actuated and the right bellcrank moved aft, the conduit slipped over the bellcrank, thus restricting any further movement back to the neutral position.

The superb effort made by this crew is an outstanding example of both individual abilities and teamwork. Through their professionalism and skill, this crew saved a very valuable aircraft, and thus enabled the determination of a serious flight control problem. A well deserved Bravo Zulu to both of these professionals.

Left to right: Capt Barry Knutson, Capt Earl Hacker

It's all downhill from here

By LT Steve Thorne
and LCDR Lew Barasha

PELON 85, you have oil streaming from your left engine!

So began my mid-Pacific odyssey while TransPac-ing an F-4J from Hawaii to Wake Island. Our position was 947 nm west of Hawaii, 500 nm south of Midway, and 450 nm northwest of Johnston Atoll. Our flight, composed of six F-4Js and five Air Force KC-135s, had been totally routine to that point.

My wingman confirmed the continued oil stream and I reviewed oil system failure procedures with my RIO. As predicted, the classic oil loss symptoms appeared, and the engine was secured as the oil pressure fell to zero. Being above our single-engine ceiling, we were immediately forced into a descent and the big, friendly formation began to slide away from us.

We took stock of our situation: 450 nm from the nearest land; 10,000 pounds of fuel; single engine; VFR on top of a solid undercast; and my intentions – land as soon as possible!

The mission commander immediately called for our divert and directed a KC-135 to detach and escort our crippled F-4 to Johnston Atoll. As we turned to our new heading, it became apparent that the en route altitude and refueling configuration would be dictated by our aircraft single-engine limitations. Air refueling from our escort would be required to reach Johnston Atoll with adequate reserves, so we attempted to plug at our max altitude of 15,000 feet and airspeed of 260 knots. Several unsuccessful plugs demonstrated that military power wasn't adequate to keep the basket engaged. Utilizing modulated afterburner, we were able to stay plugged, but the increased fuel usage resulted in a net gain of only 300 ppm. Little as it was, we were buying time and our fuel problem was alleviated.

Our KC-135 escort aided us in navigating to Johnston Atoll and a TACAN lock-on was obtained 90 nm out. Descending through the solid undercast, our destination finally came into view. An uneventful single-engine landing was performed, and we were greeted by the incredibly hospitable Johnston Atoll residents. Four days later, and with the start of a great tan, we continued the remainder of our TransPac – this time uneventfully.

This adventure came to a successful conclusion due to the professionalism and experience of the entire TransPac Navy/Air Force team. The primary lesson I carried from the incident was that **preplanning every possible emergency** prevents crisis judgment errors (not to mention mishaps). ◄

Where is it really?

By CDR V. M. Voge, MC, USN

"Lost me . . . no way! I'm flying right alongside of you, good buddy."

THIS is the fourth in a series of monthly APPROACH articles discussing the various forms of vertigo and optical illusions that you might encounter in your everyday flying. As usual, we ask you to read the preceding three articles in the series in order to have the basic background for this month's article. Even if you can't locate the first two articles, it would be a good idea to get last month's where we talked about the somatogravic illusions. This month, we promised to tell you about the somatogyral, oculogyral, oculogravic, oculoagravic, and elevator illusions, the last few of which are just VFR versions of the somatogravic illusion. Ready? Well, let's *man-up* (or *woman-up*, depending on your point of view)!

The oculogyral and oculogravic (somatogravic) illusions are, along with the coriolis illusion (see MAR '80 APPROACH), probably among the most serious that affect the **visual** apparatus. The somatogravic illusion is probably the most deadly.

The oculogyral illusion is the somatogyral illusion with visual input. The sensation is produced during angular accelerations, e.g., a coordinated turn, a sustained roll, or a spin. As you might remember from our first two articles in the series, the semicircular canals only respond for a short period of time during such maneuvers, i.e., they only let you know you're turning for a short period of time (10-20 seconds). After this, unless you look out and see the horizon, or better yet, look at your instruments, you feel as if you're flying straight and level.

The accommodation time and magnitude of the illusion can vary slightly, depending on such things as the speed and/or axis of rotation, the type of input you're getting from your other receivers (seat of your pants, eyes, stomach, etc.), position of the head, illumination of the target, and your familiarity with the scenario. Don't get too presumptuous here! Remember, familiarity breeds contempt. This is only true in coordinated turn maneuvers done by a good stick. (Of course, we all fit into that category, right?) In most circumstances, your eyes will tell you what the appropriate recovery action is. This would be either by looking out at the outside world whirling past the nose of your aircraft, or by looking at your instruments.

The somatogyral illusion comes when you take the appropriate corrective action, and the sensed acceleration is in the opposite direction (and the fluid in your semicircular canals also rushes in the opposite direction, telling you that your spin has reversed itself, although you actually may be flying straight and level). We've already discussed this when we told you about the leans and the graveyard spin/spiral. So what?! How do our eyes get into the act?

Remember your physiology training when one or more of you got the rare opportunity to sit in the rotating chair? Or way back when, as a *junior jock*, you or your best friend spun yourselves around until you were pretty dizzy? Remember looking at the spinner's eyes? They moved back and forth, more rapidly in one direction than in the other. This eye movement, as you may or may not know, is called nystagmus. Remember how the room seemed to be moving around

you, even though you were no longer turning? If you closed your eyes, it got worse, and you probably contacted *terra firma* abruptly. Having your eyes closed is similar to the somatogyral illusion, and having them open is similar to the oculogyral illusion. Sound simple? It certainly is, but in our Mod 1-A-X aircraft, it can be quite dangerous.

Imagine trying to read your instruments while they are *moving*, or if you are still one of the uninitiated, trying to get a ground reference when your eyes are telling you that you're still in a spin or a turn when you are actually straight and level! No matter how hard you may try to see straight, it normally takes at least several seconds for you to force your eyes to stop moving and to have your normal vision returned. This may carry little importance if you're at 40,000 feet, or in a low performance aircraft. But close to the ground/water, and/or in a high performance type aircraft, this can be disastrous!

For example, if you're doing a spin recovery and you feel you've neutralized your aircraft before you have actually accomplished the act, you could get yourself into big trouble. When you try to pull it out, or on the other hand, after you have recovered correctly, your eyes and semicircular canals tell you you're spinning in the opposite direction (remember the graveyard spin?). You attempt to rectify your situation (illusionary spin) by actually putting the aircraft back into a spin in the original direction. All these inputs can give you such a complex and confusing sense of perceived motion that it may be close to impossible to regain control of your aircraft! (We'll tell you more about this in our *final* article when we talk about the suspected effects of quinine water ingestion.) This, of course, applies to any *coordinated* angular acceleration maneuver that lasts more than about 20 seconds. For complicated reasons, and only for the sake of completeness, we'll mention that the visual recovery time from a roll or pitch maneuver is less than that from a yaw (or spin) maneuver. This is unimportant here.

Nystagmus (remember, the back-and-forth eye movement) is only one part of the oculogyral problem. The other problems have to do with apparent motion and with errors in locating visual targets. Even when the nystagmus has stopped (i.e., you can see 20/20 again), there are still some remaining eye movements that tend to make objects seem as if they're still moving. If you're lucky enough to have a well-defined horizon or a good orientation on your instruments, the left-over illusions of movement rapidly disappear. If, however, it is dark and you can only fixate on an isolated star or light, these false perceptions of movement can persist for many seconds, even minutes in some instances! Your target (star, light, or whatever you're fixating on) will appear to *rotate with you!* What's more, you cannot localize it, as it will be displaced in the direction of the sensation of turn. (Ever try someone else's prescription eyeglasses on and not be able to touch something right in front of you?) The bad part, as usual, is that you don't have to have a violent acceleration to feel this effect.

Case in point: LT D. S. Superjock is tooling along, VFR, at night. He sees a light way out there. He is in a slow turn. He assumes it to be his playmate (it's really a star). He perceives the light to move (only his aircraft is actually moving). He alters his flightpath to join up on his playmate. Usually, true to his name, LT Superjock will realize his error before it's too late. Our accident reports indicate that this is not always the case, however. As you may have guessed, this illusion is more common and more severe at night or during low levels of illumination.

Last month we told you about the somatogravic illusion, an illusion of a misplaced vertical during linear or translational acceleration. We tried to point out the deadly consequences of a misplaced *mother earth* (vertical force vector). At that time, we only related it to no-visual-horizon or IFR conditions; in other words, no visual frame of reference. We're going to take this illusion one step further and add visual references. This is called the oculogravic illusion. It can best be thought of as the visual component of the somatogravic illusion, as it cannot exist without the latter. Sound difficult? Not so! Read on.

Any changes in the direction or magnitude of a force vector (acceleration) will cause the eyes to try to compensate. (Remember the oculogyral illusion.) The same thing happens when there are force vector changes in translational/linear acceleration profiles. With acceleration, the eyes compensate for the backward rotation of the force vector, and the target tends to appear to move upwards. Conversely, on deceleration, the target will tend to appear to move downwards for the same reason (change in resultant force vector). (See Fig. 1.) So, what happens when we are finally established in a stable climb, acceleration, etc.? Everything returns to normal, right? Wrong! There is still a minor compensating deviation of the eye in the direction of the force vector. Your target is still slightly displaced. This could account for your poor *hit* record, right? Probably not, because when you're established at a constant rate of acceleration, the eye only deviates about one-tenth of the actual force vector displacement from gravitational vertical. This simply means that your eyes are working with your inner ear mechanisms during your initial takeoff, while the acceleration vector is still changing. Once you establish yourself, the inner ear *goes to sleep*, but your eyes are ever vigilant!

As you might imagine, the oculogravic illusion probably would not cause much of a problem during normal flight conditions when you have good visual cues, e.g., a horizon that you can relate to the canopy, instrument panel, etc. However, at night this can become a problem, just as does the oculogyral illusion. You might interpret the apparent movement of such things as runway lights as an actual change

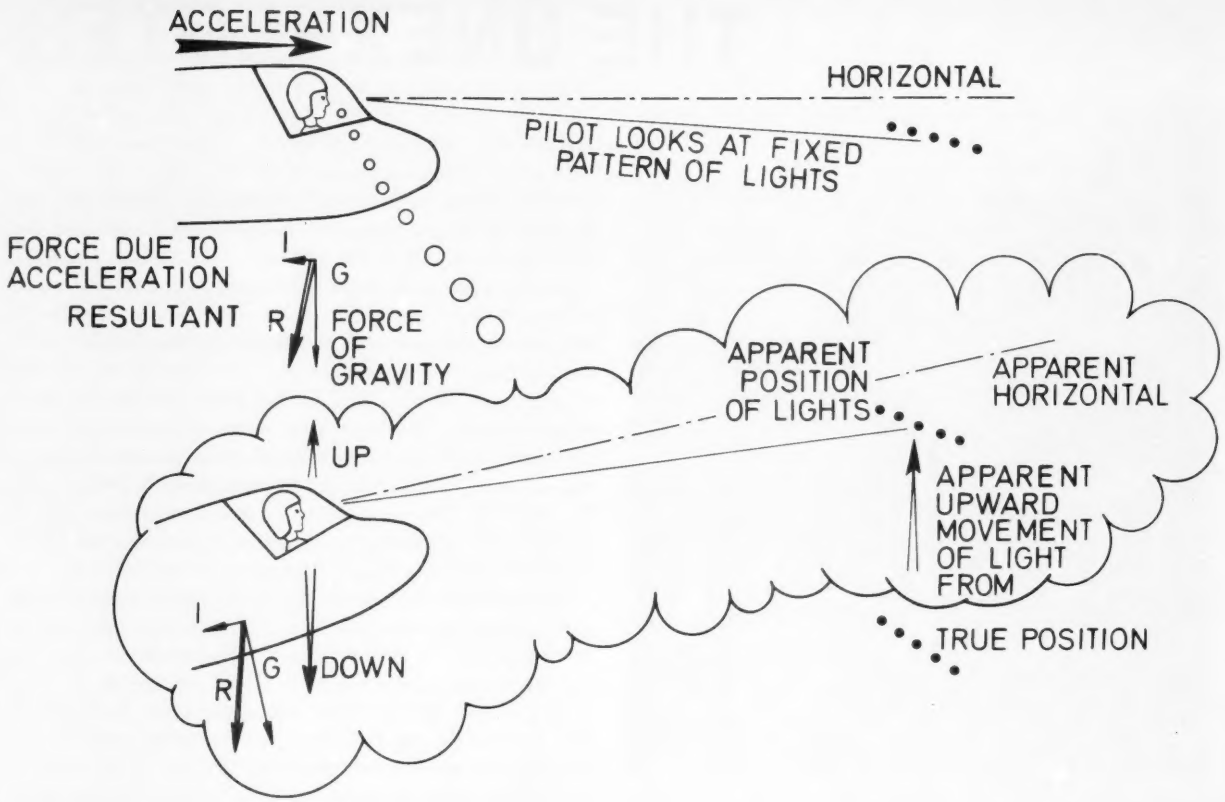


Fig. 1. – The oculogravic illusion. This is the visual component of the somatogravic illusion in which a change in the force environment causes apparent movement and false localization of observed objects.

in altitude of your aircraft and try to compensate for this. Or you may misinterpret the movement of a light or a star to be another aircraft. Just as for the oculogyral illusion, you might feel the need to either join up, or to initiate evasive maneuvers.

An example: You are accelerating on a dark night. A lone star appears to move upwards. You perceive this to mean that your aircraft has taken a slight nosedive. (Of course, you forgot to notice that your instrument panel also appeared to move up.) You compensate by raising the nose.

A related phenomenon is the elevator illusion. This usually appears when you are accelerating in an upward direction. As you shift your gaze downward to compensate for the upward linear acceleration (oculogravic illusion plus change in the length of the gravity vector), you have the impression that the instrument panel and the nose of the aircraft are rising. On the other hand, you can experience the oculoagravic illusion (the opposite of the elevator illusion) when you initiate a sudden downward acceleration (bombing run). Your immediate surroundings, including your cockpit instruments, appear to shift downward. Again, this is simply due to the fact that the gravity vector is decreased, approaching zero, and your eyes compensate for this change by automatically shifting your gaze upwards.

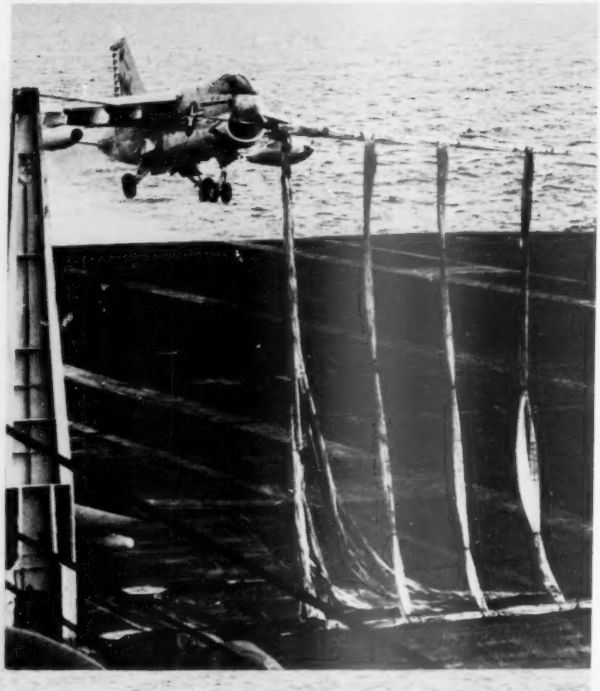
This illusion might be of particular importance any time a positive G condition is quickly followed by a zero G condition, e.g., coming off a bombing or strafing run. This one, fortunately, is not too serious. Your recovery is usually almost immediate, therefore not hazardous, unless you were to repeat this maneuver several times. If you're usually too busy in the cockpit to think about these last two illusions, you can experience them simply by riding in a fast elevator, going up or down. As you will see when you do this, the error is in the *apparent* movement up or down, although neither you nor the walls of the elevator are actually moving. And you always thought seeing was believing!

The cure for all these problems? First, be aware of and admit that there is a problem, and then get on your instruments! Probably your biggest safeguard is simply knowing that these illusions exist and being ready to cope with them. Enough?

Well, we've finally run out of illusions caused by normal inner ear functions/responses. Next month, we'll start telling you about some of the disorientation problems you can experience from visual misinterpretations. Your eyes will be the guilty parties, not the inner ear mechanisms. These illusions include target fascination, the breakoff phenomenon, and the autokinetic phenomenon. ◄

THE UNEXPECTED

By LT Bruce P. Eaton
VA-27



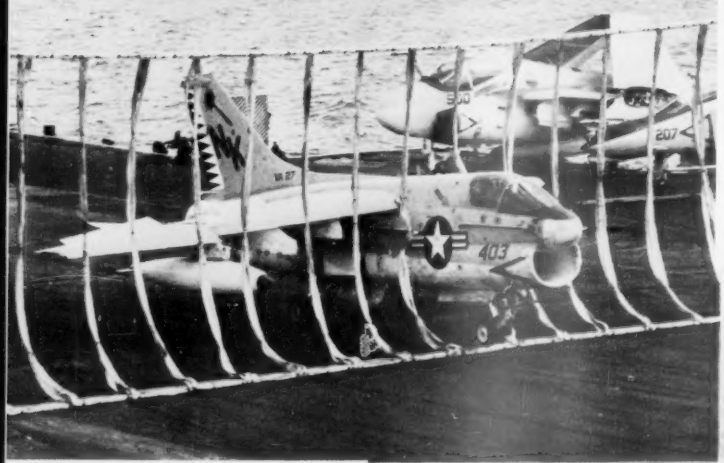
"YOU'VE lost your hook." "Say again, Boss?" "You've lost your hook. It's lying on the deck." Let's see now, no hook, no divert . . . BARRICADE!

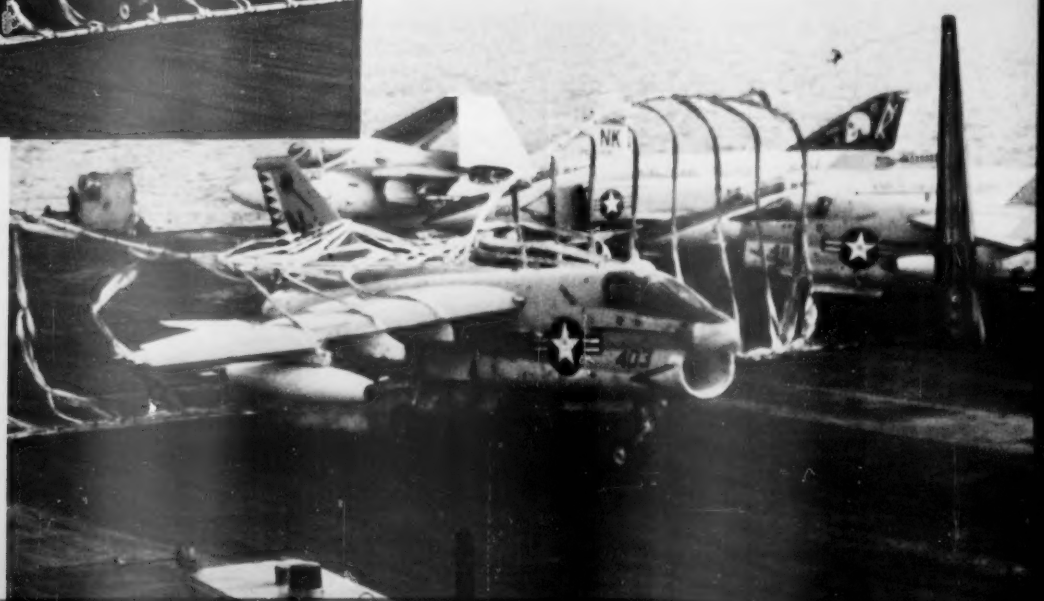
We've all read accounts of accidents, and through the medium of Monday morning quarterbacking, have added our 2 cents worth and possibly thought for a few minutes about what we might have done.

What starts out as a most routine flight can often turn into a bag of worms. My hop was a morning launch in a tanker-configured A-7E from USS CORAL SEA on *Gonzo Station*, Indian Ocean. All was routine, boring concentric circles in the sky, with the only spice added by a functional test firing of the M61 gun. I returned to the break, dirtied up, and set up for what was to be a routine day trap, or so I thought!

The pass was a fairly comfortable OK (SIC) two wire. I had added power to counter the settle, and engaged the wire at close to MRT. The aircraft trapped, and as I felt the reassuring tug and deceleration, I began to retard the throttle to avoid getting hung in the gear. Then something different happened! The hook had engaged the wire and caused the arresting gear ram to move 85 inches of its normal 170-inch travel; then the entire hook shank separated from the aircraft. I felt a good jolt and realized the aircraft was still rolling. My first thought was of reading about somebody breaking the wire, dribbling off the angle, and ejecting. Not wanting to get wet, I chose to try and coax her airborne. The airspeed I noted was 100 knots, and realizing my brakes wouldn't help, I jammed the throttle to MRT and waited those agonizing seconds for the turbofan to wind up again.

Continuing down the angle on a mini deck launch, I left





the deck at 110 knots and 18 units AOA. The plane was still flying, barely, so I chose to ride it as long as possible. The angle-of-attack increased through rudder shaker and then to 24 units, approximately one unit below stall, but the VSI never dipped below 100 FPM down. Slowly, the airspeed increased, the VSI showed a slight rate of climb, and the angle-of-attack returned to normal. The Boss transmitted, "403, you've lost your hook." I climbed overhead to burn down to the maximum landing weight allowed for the inevitable barricade arrestment.

From here on it was pretty much like everyone said it would be, although I must admit I expected to hear some panic calls after losing the hook. The fact that no one said anything for those first few seconds was really good, because I was spring loaded to tne EJECT position, and would probably have gotten out at the first syllable uttered over the radio. The LSOs gave me an excellent brief on barricade procedures, and a few jokes back and forth helped to lessen the anxiety as I held overhead.

The recovery was completed, and the deck crew went to work and had the barricade rigged in what had to be record time. I mentally went over the approach procedures. The barricade blocked a lot of the deck from view, and appeared to be 100 feet high and aft of the No. 1 wire. The ball, however, was still visible. You really have a sense of closure on the webbing as it approaches your cockpit. Upon touchdown, I secured the throttle and instantly began to hear all the associated noises of landing: the straps whipping over the canopy, metal ripping, and my tires squealing. (I braked for good measure after thinking I had ripped through the net!) Then it was all over except for the sea stories.

Now for the Monday morning quarterbacks. Why didn't you jettison the tanks? I was too busy trying to push the throttle through the instrument panel. Would you have done the same thing at night? Probably not; the visual cues available during the daylight enabled me to ascertain that I was still flying. It was obvious to me that slow speed, high AOA flight, which we all have practiced, is feasible in some situations. In this case, familiarity with the aircraft's flight characteristics and a little luck enabled me to continue to control the aircraft in a less than optimum situation. I'm glad that all parties responded quickly and helped me bring her back aboard. Just take a few moments and imagine what you would have done, and remember – expect the unexpected.

Photos by PHAN Curt Fargo

LETTERS
to the editor

Sitting on Information

FPO, San Francisco – After a CH-46 suffered a blade strike on turnup on LPH spot 2, and after an AH-1 suffered a blade strike on turnup on LPH spot 1, the MAU commander established a local policy prohibiting all flight operations on spot 1. His aviation advisors in his subordinate helicopter squadron did not tell him that local policies are not the final forum for changing aircraft operating envelopes. The decision to take decisive action is laudable. However, if the commander had sufficient reason to eliminate all operations on spot 1, then he should have also submitted an urgent safety of flight NATOPS change recommendation so that other aircraft operators could benefit from his decision.

Unfortunately, the next inchopping helicopter squadron was not aware of the MAU commander's policy. Four days prior to inchop, one pilot was killed, one pilot received major injuries, and one aircraft was lost in an accident involving a CH-46 on spot 1. Upon inchop, the squadron received a hand-delivered letter stating the 3-week-old policy. How can I explain that to my friend's widow?

Name Withheld

• An urgent change to NWP-42 would have been the appropriate action in this case, since there is no LPH NATOPS Manual in existence yet. The AH-1 accident report was transmitted 4 days late, and did not allow time for readdressal to the inchopping MAU. This situation is another example where timely mishap reporting might have prevented an accident and a fatality.

NORDO Traffic

Springfield, VA – In reference to LCDR Donaldson's article titled "Who's in Control?" in the APR '80 issue, I would like to submit that a primary contributing cause to the incident described was not addressed – the common practice of treating NORDO (no radio) traffic as though they were normal traffic.

If the NORDO is the only traffic in the pattern or being worked for approach, there is probably no problem. However, when there are any other aircraft in the area, a NORDO qualifies for emergency treatment. The reason is vividly exemplified by the incident cited. Any safe separation lost by unanticipated action of the NORDO must be compensated for by the communicating aircraft. This may occur at the worst possible time, place, and configuration, and certainly adds an unnecessary element of risk to the traffic handling environment.

In the incident cited, as in most with which I have had experience, there is no valid reason for not "dogging" the NORDO until the pattern is clear, or conversely, clearing the pattern until he's down safely. It may take a few more minutes to get everyone safely aboard, but the reduction in risk and anguish should be well worth the inconvenience.

CDR Ira J. Rimson, USN-Ret.
President, System Safety Associates Ltd.

Re: "A Near Rollover" SEP '79 APPROACH

Philadelphia, PA – Your article provides the picture of an H-46, in an operational mode, with incorrect tiedowns.

I am enclosing the manual pages which show the correct tiedown arrangement. Please observe the **Warning** which cautions personnel not to use the tiedown arrangement shown in your article. I feel this is a sensitive issue in light of a recent shipboard incident, and suggest personnel be advised about the error.

Walter Yorke
Senior Service Engineer
Product Support Dept.
Boeing Vertol Co.

• You are correct. The heavy weather tiedown configuration, as depicted in the illustration, should *not* be used during rotor operation.

Re: "Hours of Boredom . . . ?" MAR '80 APPROACH

NAS Brunswick – Reading LT Hill's article about the hung-up starboard mainmount reminded me of all the incident/accident reports I have ever read. Everything was done by the numbers, "in accordance with NATOPS." That's the expression we always use, right down to the phone patch set up between base and the aircraft. That was headwork; I liked that. The decision to use the alternate airfield, better weather, better runway, better crash facilities, I like all of that, too. Where I stopped liking it was when I realized that the plane and crew were on their way to the alternate and they were still "dead lifting" the manual release handle.

Why, when the wind was reported on the nose at 70 knots, fuel was critical, and the weather was definitely better at the divert, did they choose to play with the gear en route? Just suppose they had not been as lucky as they were. Suppose Homeplate socked in just as that gear came down; you do not raise it and continue on your way to the alternate – you leave it down. In the circumstance described by LT Hill, I wonder if they would have made it. "In accordance with NATOPS" is fine, but let's not forget the beginning paragraph in that book that starts with the title of *Scope*.

LCDR H. R. Freeman

Blow the Men Down . . .

FPO, San Francisco – The aircraft carrier flight deck awaiting flight ops has been described as the most dangerous place in the world. The following incident occurred recently on a flight deck of a carrier. It got my attention and served to illustrate the dangers inherent in carrier flight operations.

I was sitting in my helicopter on a sunny day, somewhere between Hawaii and Guam, waiting for takeoff clearance. I watched the various aircraft slowly maneuver for their position in line for the cat shot. Suddenly, a group of personnel on deck were caught by the exhaust from an A-7 making a 270-degree turn. The A-7's jet blast was forcing them to hold on for dear life to anything available, including other aircraft and padeyes. They were within a few feet of the deck edge, and to make matters worse, the nosewheel of the A-7 became cocked, so its pilot was adding power to straighten it. I watched anxiously as the men on deck crawled to safety by forming a human chain and pulling each other out of the jet blast. Later, I talked to one of the persons involved who told me that the personnel had misjudged the A-7's maneuvering and were caught by surprise when the aircraft exhaust was turned on them. There was no place to run. The taxi director either did not see these men, or completely failed to consider the safety hazard when he taxied the aircraft by them. Hindsight says the director should have held the aircraft for the short time it would have taken the group to clear the area.

Situations such as this continue to amplify the well-deserved reputation for danger of carrier flight operations. No one was hurt or blown overboard in this case, but the potential was there. The need for a heads-up attitude on the flight deck is obvious. You can trust no one to look out for your safety or that of your men but yourself. And no one should ever trust or turn their back on a moving aircraft.

LTJG J. S. Bennett
HS-8

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PH1 Randy Emmons

PROFESSIONALLY SAFE MEN CAN DO DANGEROUS JOBS, WITH TOTAL CONFIDENCE, DAY AFTER DAY.

Poster idea contributed by LCDR Jay Tyler, VAQ-138 Yellowjacket Safety Officer.

Naval Safety Center
NAS Norfolk, Virginia

Complacency

"Same old tune, we can hack it. Piece of cake."

"O.K. Wingman, the weather is poor, but we've been there lotsa times. I know the target cold!"

CRASH!

"Brief? What brief? It was the same old hop, you know, nothing new."

KILLS! (and it hurts, too.)

NAVAL SAFETY CENTER
NAS NORFOLK, VIRGINIA